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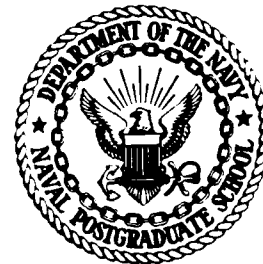
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**COMPILATION OF
ABSTRACTS OF THESES
SUBMITTED BY
CANDIDATES FOR
DEGREES**

REPORT FOR THE PERIOD
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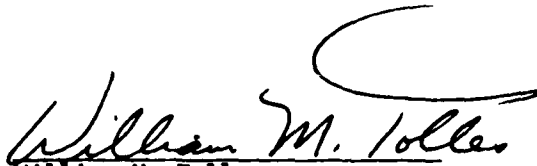
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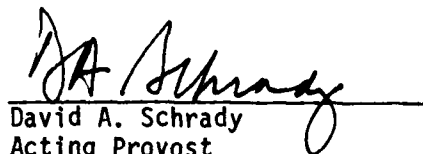
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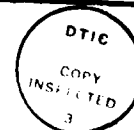
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DOCTOR OF PHILOSOPHY

ADAPTIVE IMAGE PROCESSING AND IMPLEMENTATION
BY MULTIPLE MICROCOMPUTER SYSTEM

Haim Amir
Lieutenant, Israeli Navy
B.S., Technion Israel Institute of Technology, 1972

This thesis has two parts, both related to the development of smart sensor systems. The first part is a theoretical development of two families of adaptive spatial filters for suppressing background clutters in infrared images and based on the minimization of mean squared error or the maximization of signal to noise ratio criterion. Seven different nonlinear search techniques have been developed for the adaptation process. They have been applied to two real world infrared test images and exhibit fast convergence rate with no misadjustment. The second part is an experimental development of a multiple microcomputer system which can be a candidate for an on-board processor system. A multiple star, multiple cluster architecture was developed whose inter-communication is managed by a three-level control including central controller, distributed controller and random priority controller. The adaptive spatial filter has been successfully implemented on this system using partitioning for parallel computing.

Doctor of Philosophy in
Electrical Engineering
December 1980

Advisor: T. F. Tao
Department of
Electrical Engineering

A NUMERICAL STUDY OF THE ROLE OF AIR-SEA
FLUXES IN EXTRATROPICAL CYCLOGENESIS

Scott Alohonse Sandgathe
Lieutenant, United States Navy
B.S., Oregon State University, 1972

This study uses a numerical model to investigate the effect of the air-sea fluxes of sensible heat and moisture in extratropical cyclogenesis over the open ocean. The model is a sectorized version of the UCLA general circulation model including the Arakawa-Schubert cumulus parameterization. Idealized initial conditions are specified in the atmosphere and ocean that are typical of open-ocean fall and spring conditions.

Adiabatic and diabatic model results are compared over a 15-day integration period. Diabatic processes, including the surface fluxes, cause a large reduction in low-level static stability during the initial cyclone growth period. This reduction in static stability, as well as the latent heat release, leads to the rapid growth of wave numbers 12 and 18 in the diabatic model experiment, while only wave number 6 is present in the adiabatic experiment. The growth of the cyclones is much more rapid in the diabatic experiment. However, cyclones in the adiabatic experiment attain similar maximum intensities as in the diabatic experiment, and undergo an analogous decay period. After development of the initial cyclone, a variety of secondary low developments occur in the diabatic experiments that are similar to those observed over the open ocean.

Doctor of Philosophy in
Meteorology
September 1981

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The role of the air-sea fluxes is studied by selectively removing the surface fluxes at various stages of the cyclone development. Removal of the air-sea fluxes produces significant changes in the evolution of the diabatic model cyclones. Removal of the surface sensible heat flux results in an intensified low-level temperature gradient in the developing cyclone. The enhanced low-level temperature advection increases large-scale lifting and therefore latent heat release, resulting in an intensification of the cyclone. Removal of the surface moisture flux prevents the development of secondary lows which might otherwise eventually replace the primary cyclone, as occurs in the complete diabatic model. These model results are not verifiable with observations, however, they show a mechanism by which some disturbances over the ocean could develop while other seemingly similar disturbances would not.

OPTIMAL ALLOCATION OF TACTICAL MISSILES BETWEEN
VALUED TARGETS AND DEFENSE TARGETS

Erez E. Sverdlov
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B.Sc. Physics, University of Tel Aviv, 1967

Various combat duels between an attacker, who owns a stockpile of long range precision-guided missiles, and a defender are addressed. The defender must defend a valued target, or several valued targets (called primary targets) by a group of defending targets (called secondary targets, and are usually understood to be surface-to-air missile batteries). The problem of the attacker is to allocate his missiles between the primary and the secondary targets so as to optimize various measures of effectiveness. The models are divided into two different categories:

- (a) Models in which the attacker must find optimal sequencing of missiles which are either anti-primary or anti-secondary missiles.
- (b) Models in which the attacker must find optimal sequencing of missiles which are either real (anti-primary) missiles or decoys. Two mechanisms by which decoys may enhance effectiveness, namely, exhaustion and saturation of the defense, are quantitatively explored.

Various cases are examined in the thesis, which makes a heavy use of stochastic dynamic programming and sequential games techniques. Some numerical examples are also given.

Doctor of Philosophy in
Operations Research
September 1981

Advisor: B. O. Shubert
Department of
Operations Research

AERONAUTICAL ENGINEER

AN INVESTIGATION OF PARTICULATE BEHAVIOR IN SOLID ROCKET MOTORS

Stavros George Karagounis
Major, Hellenic Air Force
B.S., Naval Postgraduate School, 1980
M.S., Naval Postgraduate School, 1980

An apparatus was developed which used diffractively-scattered laser power spectra measurements for determination of exhaust particulate size from solid rocket motors. The apparatus was calibrated by using glass beads and aluminum oxide powder, and then used with success to estimate the mean diameter of the exhaust particles of a small solid rocket motor. Scanning electron microscope measurements of the exhaust particles were employed for comparison and verification.

Holographic pictures from burning propellant strands and slabs of different compositions were obtained at different pressures and compared to corresponding high speed, high resolution motion pictures.

Aeronautical Engineer
June 1981

Advisor: D. W. Netzer
Department of
Aeronautics

A COMPUTER ANALYSIS OF THE PLASMA-BOUNDARY
LAYER BEHAVIOR OVER A POSITIVE ELECTRODE

Stephen Ted Van Brocklin
Lieutenant Commander, United States Navy
B.S., Clarkson College, 1969
M.S., University of West Florida, 1971
M.S., Naval Postgraduate School, 1980

A stable numerical procedure for solving the coupled, nonlinear equations of electron and ion conservation and electrical potential (Poisson's equation), is described. A two-dimensional model with periodic active sites on a flat plate is utilized to obtain both qualitative and quantitative results which clearly illustrate the self-generating sheath and ambipolar regions adjacent to a non-emitting electrode. The active sites are characterized as voltage sources and by electron densities depressed from both the non-active wall and the free-stream values. Various cases of species density at the non-active wall are evaluated. Recombination/ionization plays an important role in establishing the boundary layer behavior in the ambipolar region and in the dimensionality of the problem formulation. Application is for Nitrogen gas at one amagat in a pulsed discharge of about 50 micro-seconds in duration.

Results clearly demonstrate the boundary layer nature of the species density at the electrode. A sheath length of 38 microns about a 35-volt active site and 5-20 microns along the non-active portion of the electrode is established. Joule heating is determined to be not important.

Aeronautical Engineer
June 1981

Advisor: O. Biblarz
Department of
Aeronautics

ELECTRICAL ENGINEER

FOURIER ANALYSIS OF BROADBAND, LOW-LEVEL
SIGNALS USING SWITCHED INPUTS

Gary L. Howarth
Lieutenant Commander, United States Navy
B.S.M.E., Northwestern University, 1969

A new technique for estimation of the spectrum of an unknown signal is investigated. The technique combined a radiometric method of signal detection (modulating the receiver noise with the assumed signal by alternately connecting and disconnecting the input transducer) with a Fast Fourier Transform processor for spectral analysis. After obtaining averaged spectral estimates with the transducer (antenna) connected and disconnected the difference is formed and statistical analyses applied to determine statistically significant terms. The significant components comprise the estimate of the spectrum of the signal.

Analytical results are derived for sinusoidal signals and uncorrelated, Gaussian noise. Experimental results for both narrow and wideband signals and additive Gaussian noise are presented. Reasonable spectral estimates of a wideband signal are obtained with 16 averages when the composite signal-to-noise ratio is 0 dB.

Electrical Engineer
June 1981

Advisor: G. A. Myers
Department of
Electrical Engineering

DESIGN OF A MAGNETIC TAPE TRANSPORT SYSTEM EMPLOYING STEPPER MOTORS

Sotirios A. Tsavdaris
Captain, Greek Air Force
M.S., Naval Postgraduate School, 1980

A magnetic tape transport system employing stepper motors has been investigated and developed. Before the investigation of the system, a mathematical model for a four-phase permanent magnet stepper motor was developed and its behavior studied by computer simulation.

At the beginning, a system was proposed employing a single tension spring between the take-up motor and its reel to maintain a tape tension. From computer simulation it was found that such a scheme does not regulate tape tension within acceptable limits. A new scheme was proposed using two tension springs between the two motors and their reels. From the simulation it was shown that this scheme is acceptable since the tape tension is kept between the specified limits and the stepper motors execute the tape transfer commands without any failure.

Electrical Engineer
December 1980

Advisor: G. J. Thaler
Department of
Electrical Engineering

MASTER OF SCIENCE

IN

AERONAUTICAL ENGINEERING

SUBSONIC CASCADE WIND TUNNEL TESTS USING
A COMPRESSOR CONFIGURATION OF DCA BLADES

Frank S. Cina
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

Tests are reported in which air incidence angle was varied to a cascade of 20 blades, 5 inches in chord with aspect ratio of 2.0 and solidity of 1.67. Preliminary blade element performance data were obtained using pneumatic probe surveys and surface pressures were also measured. Results of preparatory tests of a similar cascade of 15 C-series blades at a solidity of 1.28 are also included. Whereas the flow in the C-series blading cascade was always acceptable, the flow in the DCA blading cascade was not acceptable at negative incidence angles. A modification of the cascade inlet guide vanes is recommended which will guarantee periodic conditions and serve to generate more nearly uniform inlet flow at all test conditions.

Master of Science in
Aeronautical Engineering
June 1981

Advisor: R. P. Shreeve
Department of
Aeronautics

DEVELOPMENT OF A DATA ACQUISITION AND REDUCTION SYSTEM FOR FATIGUE TESTING

Jerry Wayne Dalton
Lieutenant, United States Navy
B.S., University of Texas at Austin, 1975

A data acquisition and reduction system has been created for aircraft materials fatigue testing. The system uses an HP-9835 Desktop Calculator, an HP-2240A Measurement and Control Processor and a Materials Testing System loading machine. Three different computer programs on the HP-9835 are used to analyze material properties, simulate inflight fatigue loading and computer fatigue damage at a stress concentration. The flight loads are selected from Mil Spec 8866 and applied in a random order. The fatigue damage at a stress concentration is calculated from the applied local stresses using Miner's Law.

Master of Science in
Aeronautical Engineering
September 1981

Advisor: G. H. Lindsey
Department of
Aeronautical Engineering

EFFECT ON FUEL EFFICIENCY OF PARAMETER VARIATIONS IN THE COST
FUNCTION FOR MULTIVARIABLE CONTROL OF A TURBOFAN ENGINE

Barry Lawrence Dougherty
Lieutenant, United States Navy
B.S.A.E., United States Naval Academy, 1972

In modern turbofan engines, variable geometry has been incorporated to improve some off-design performance. Most control designs ignore this variable geometry and use fuel metering as the primary control input.

This thesis investigates the use of variable geometry to control the engine and, thereby, reduce fuel consumption due to transients. Additionally, steady-state trim conditions are altered to reduce the static fuel consumption. The non-linear transient simulation program is used to analyze the steady-state operating condition and develop small perturbation control limitations. Linear models, both large and reduced order, are used in analyzing the effect of controllers on system response. A computer program was generated to reduce a large order linear model to a usable size for control system development.

This analysis shows the reduced-order regime dependent controllers to be viable and to favorably enhance the quest for reducing specific fuel consumption in existing engines.

Master of Science in
Aeronautical Engineering
September 1981

Advisor: D. J. Collins
Department of
Aeronautics

CONTROL STRATEGIES OF AN INVERTED PENDULUM

Richard Warren Harding
Lieutenant Commander, United States Navy
B.S., North Carolina State University, 1971

In a space booster on takeoff, a control system must be employed to prevent the rocket from falling over as it is forced upward by the engines. One accurate dynamic model of the space booster on takeoff is the inverted pendulum.

This paper investigated the inverted pendulum system from development of equations of motion, through implementation of an actual inverted pendulum system using state variable feedback control. The concept of state variable feedback was analyzed in determining a solution to the problem of control of the inverted pendulum.

Most importantly, design and construction of a working, solid state controlled, inverted pendulum demonstration model was accomplished.

Master of Science in
Aeronautical Engineering
September 1981

Advisor: D. J. Collins
Department of
Aeronautics

AN ELASTIC-PLASTIC FINITE ELEMENT ANALYSIS
OF NOTCHED ALUMINUM PANELS

Michael John Kaiser
Lieutenant Commander, United States Navy
B.S., St. Cloud State University, 1969

Finite element, elastic and plastic analyses of various aluminum panels containing holes and notches were conducted for comparison with photoelastic experimental results. A FORTRAN IV program, ADINA (Automatic Dynamic Incremental Nonlinear Analysis), was used for both linear and nonlinear analyses. Mesh refinements were used for each panel and the monotonically convergent results were extrapolated using Richardson's method. Stresses were locally smoothed from the Gauss integration points to the nodal points. Eight noded, isoparametric elements were used throughout. Modification to an ADINA preprocessor program, also coded in FORTRAN IV, was made for use with a VERSATEC plotter.

Comparisons were made to the elastic, analytic series solution by Howland for a circular hole in a finite strip. The finite element results varied by less than one percent from Howland's solution. Handbook values for the elastic stress concentration factors of the geometries investigated differ from finite element results by less than one percent in all cases. The photoelastic works of Forcht were also compared where applicable. Stresses in the plastic range obtained from slip-line theory for a rigid-perfectly-plastic material show excellent correlation to a finite element analysis of such a material. Comparisons to elastic and plastic experimental data were made for the panels analyzed and show good correlation to finite element results.

Master of Science in
Aeronautical Engineering
March 1981

Advisor: G. H. Lindsey
Department of
Aeronautics

MICROPROCESSOR GENERATED VERTICAL GYROHORIZON
INSTRUMENT FOR THE BLUE BIRD SIMULATOR

Marc A. Lucchesi
Lieutenant, United States Navy
B.S., Miami University, 1974

An X-Y cathode ray tube display for use in a high-performance aircraft simulator facility as a Vertical Gyrohorizon Instrument was investigated. A microprocessor was used to generate the correct angle for the display corresponding to the analog equations of motion of the simulator. An unfavorable displayed result was obtained. Detailed conclusions and recommendations for further study are presented.

Master of Science in
Aeronautical Engineering
December 1980

Advisor: D. M. Layton
Department of
Aeronautics

HARDWARE AND SOFTWARE IMPROVEMENTS TO A PACED
DATA ACQUISITION SYSTEM FOR TURBOMACHINES

Patrick Anthony McCarville
Lieutenant Commander, United States Navy
B.S., University of New Mexico, 1972

Modification of the phase lock loop synchronizing circuits and of the method of input/output communication used in a synchronized data sampling system, are reported. A device known as PACER which used an analog phase lock loop for synchronization and produced a non linear set of synchronizing pulses, was modified to use a CMOS digital phase lock loop, resulting in a linear set of pulses. The associated programming which controlled the data acquisition process and sequencing, was changed to use the direct memory access feature of the system computer. This enabled data, from high response pressure transducers mounted in a turbomachine, to be taken once every rotor revolution rather than once every ten revolutions. A user's manual for paced data acquisition is included.

Master of Science in
Aeronautical Engineering
June 1981

Advisor: R. P. Shreeve
Department of
Aeronautics

AN INVESTIGATION OF THE COMBUSTION BEHAVIOR OF SOLID FUEL RAMJETS

Michael Emmanuel Metochianakis
Captain, Greek Air Force
B.S.M.E., Naval Postgraduate School, 1979

An experimental investigation was conducted to determine if there was a relationship between basic fuel properties and obtainable solid fuel ramjet combustion efficiency. The thermal behavior of different fuels was examined using differential thermal analysis and gas chromatography. Hot firings were made for those fuels with significantly different thermal characteristics. Fuels that had a dominant endothermic decomposition behavior and that produced low molecular weight pyrolysis gases had high combustion efficiency in non bypass configurations. Fuels with low temperature exothermic behavior and high molecular weight pyrolysis gases had high combustion efficiency in non bypass configurations. Fuels with low temperature exothermic behavior and high molecular weight pyrolysis gases had high combustion efficiency when bypass air was used. Near wall mixing within the fuel port resulted in decreased combustion efficiency for plexiglass and increased combustion efficiency for HTPB based fuels. Radiation was incorporated into an existing finite difference computer model for the SFRJ combustion process and resulted in improved predictive capabilities.

Master of Science in
Aeronautical Engineering and
Mechanical Engineering
December 1980

Advisor: D. W. Netzer
Department of
Aeronautics

PHOTOELASTIC STUDY OF ELASTIC AND PLASTIC
STRESS FIELDS IN THE VICINITY OF A NOTCH

Frank E. Stenstrom
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

The ability to calculate stresses in critical areas by measuring strains at far-field locations will be essential to the success of new fatigue monitoring equipment currently being developed. In this thesis the photoelastic method was utilized to study plastic zone characteristics and residual compressive stresses in critical areas modeled by notched specimens. Data reduction methods for photoelastic measurements were developed by a thorough investigation of reinforcement effects and by a careful determination of material properties of PS-1C Photoelastic Material and 7075-T6 aluminum. A modified Ramberg-Osgood data reduction method was developed for determining stresses from strains measured in the plastic region. Stresses obtained from slip-line theory for rigid-perfectly-plastic material were compared to the experimental results, and differences noted. Notch tip stresses and strains were compared to predictions using Neuber's relation. The measured data indicated stress concentrations 20.9% lower than predicted by Neuber.

Master of Science in
Aeronautical Engineering
December 1980

Advisor: G. H. Lindsey
Department of
Aeronautics

DESIGN OF AN APPARATUS FOR THE STUDY OF ELECTROSTATIC EFFECTS
ON GAS TURBINE FUEL SPRAYS AND COMBUSTION EFFICIENCY

Loren Logan Todd
Major, United States Army
B.S., United States Military Academy, 1970

The theoretical effects of an electrostatic field on the atomization process of a fuel nozzle and the resulting change in flame characteristics and combustion efficiency which can be expected are presented. Included are a discussion of the atomization process, electrostatic effects on fuel droplet size, and combustion of a fuel droplet.

To demonstrate electrostatic effects on atomization, a model jet engine combustion chamber was constructed which performed effectively. However, during attempts to introduce the necessary high electric field, the flame grounded the voltage and no definitive results have been obtained.

Master of Science in
Aeronautical Engineering
September 1981

Advisor: J. Miller
Department of
Aeronautics

ELECTRIC DISCHARGE FLOW INTERACTION IN
PARALLEL AND CROSS-FLOW ELECTRIC FIELDS

John William Wainionpaa
Lieutenant Commander, United States Navy
B.S., University of New Mexico, 1972

This work deals with an evaluation of power capacity of two glow discharge orientations with respect to a flowing medium. A test section was designed and fabricated to compare the effects of flow, turbulence generated by perforated plates, electrode spacing and electrode length on the cross-flow electric field to the performance of an existing parallel flow electrode set of the same type: positive pin-rack (anode) and plane (cathode). Discharge data and photographs are presented.

Flow and turbulence are stabilizing. The parallel flow electric field discharge permits higher power than the cross-flow field. Increased cathode length in the streamwise direction is a detriment to discharge power.

Master of Science in
Aeronautical Engineering
September 1981

Advisor: O. Biblarz
Department of
Aeronautics

STEADY/OSCILLATORY, SUPERSONIC/HYPERSONIC INVISCID FLOW PAST OSCILLATING
WINGS AND WEDGE COMBINATIONS AT ARBITRARY ANGLES OF ATTACK

Evangelos Vlassios Youroukos
Major, Hellenic Air Force
Mechanical Engineer Degree, Hellenic Air Force Academy, 1965
Electrical Engineer Degree, Polytechnic of Patras, Greece, 1975
B.S., Naval Postgraduate School, 1980

The perturbation method proposed by Professor Hui is described. The method gives exact solutions for the perturbed flow over both sides of a flat plate which is oscillating with small amplitude and frequency at large angles of attack in steady supersonic/hypersonic inviscid flow provided that the shock remains attached. Using the strip theory concepts these solutions are extended to study the dynamic stability in pitch of a flat, periodically oscillating wing or arbitrary planform shape, at large angles of attack. Finally, Hui's perturbation method is extended to include the effects of upstream disturbances on a stationary wedge.

Master of Science in
Aeronautic Engineering
June 1981

Advisor: M. F. Platzer
Department of
Aeronautics

MASTER OF SCIENCE

IN

COMPUTER SCIENCE

AUTOMATIC RECOVERY IN A REAL-TIME, DISTRIBUTED
MULTIPLE MICROPROCESSOR COMPUTER SYSTEM

Richard Lewis Anderson
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

This thesis presents an automatic recovery design that supports the fault-tolerant performance of a real-time, distributed, multiple microcomputer system. The recovery mechanism is structured to maintain real-time processing applications where a record of previous computations is not required and data loss is tolerable during the period of recovery. The automatic recovery technique employed is based on system reinitialization in which the system is restored to its original initialized state and then restarted. The automatic recovery mechanism has been integrated with a hierarchical, distributed operating system which supports a multiprogramming environment. A distinct address space for each system process, that is preserved by the hardware's explicit memory segmentation, in conjunction with the independent kernel and user domains of the operating system are used to facilitate dynamic relocation among identical processor modules. The result is a flexible environment that supports the dynamic reconfiguration of processors and memory during the period of reinitialization.

Master of Science in
Computer Science
December 1980

Advisor: R. R. Schell
Department of
Computer Science

INITIALIZATION DESIGN FOR DYNAMIC DETERMINATION OF RESOURCES

Gary Stewart Baker
Lieutenant Commander, United States Naval Reserve
B.S., California State College, Los Angeles, 1970

This thesis presents a versatile initialization design for dynamic determination of physical resources in an adaptive manner for a multi-microprocessor environment. The design is general in nature and represents a structured, functional approach to the initialization process based on the use of dynamic resource mapping, knowledge passing between layered program components, and coordinated interprocessor communication. An implementation of this design is presented for initialization of the Secure Archival Storage System. The hardware architecture utilizes the commercially available Z8000 based Advanced Micro Computer Am96/4116 MonoBoard Computer, configured to support information security.

Master of Science in
Computer Science
June 1981

Advisor: R. R. Schell
Department of
Computer Science

ALTERATION OF THE CP/M-86 OPERATING SYSTEM

Michael Bruno Candalar
Lieutenant Commander, United States Navy
B.S.M.E., United States Naval Academy, 1972

CP/M-86 is microcomputer (INTEL 8086) operating system developed and marketed by Digital Research. The operating system is designed so that a user can adapt the system to his own input/output hardware devices. This thesis develops interfaces to two floppy disk controllers, the iSBC 201 (single density) and the iSBC 202 (double density) controllers. The interface includes the writing of a boot loader embedded in the iSBC 957 Execution Vehicle Monitor, the monitor system for the INTEL iSBC 86/12 single board computer. Also included is an interface module for the cold start loader (loader BIOS) and an input and output interface, BIOS. A design for the interface module of typical systems based on Winchester technology hard disks is also presented.

Master of Science in
Computer Science
June 1981

Advisor: U. R. Kodres
Department of
Computer Science

A MICROCOMPUTER SYSTEM FOR TARGET INFORMATION IN THE FIRE
SUPPORT COORDINATION CENTER: A DATA BASE APPROACH

Ronald J. Coulter
Lieutenant Colonel, United States Marine Corps
B.S., College of the Holy Cross, 1964
M.A., Pepperdine University, 1975

This thesis presents the specification, design and implementation of a prototype microcomputer system for the target information section of the Marine Corps fire support coordination center. Currently, the target information section uses a series of index cards, handwritten lists, acetate covered battle maps and grease pencils to perform the target information functions.

The thesis examines and analyzes these functions in detail and proposes a solution in the form of a system, data base and interactive user design. The resultant Microcomputer System for Target Information (MISTI) employs an ALTOS Z-80 microcomputer, the UCSD Pascal operating system, a user friendly interface and data base technology. It is proposed as an interim system until the Marine Integrated Fire and Air Support (MIFASS) becomes operational.

Master of Science in
Computer Science
June 1981

Advisor: L. A. Cox, Jr.
Department of
Computer Science

MICROCOMPUTER BASED SHIP-BOARD
GUN CONTROL SYSTEM

Ahmet Erdogan
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1979

This study was undertaken to design and implement a microcomputer based gun control and interactive display system which is suitable as a model of a shipboard Gun Fire Control System and Tactical-Situation display. The stand-alone system includes two plasma display scopes, a microcomputer, a cathode ray tube (CRT), an analog-to-digital, digital-to-analog (ADC/DAC) board and a servo unit. The scope of the effort includes calculation of target information, prediction of target values, solution of anti-air warfare and surface fire control problems. The servo unit was connected to the computer through the ADC/DAC board. The use of the servo unit and the true-motion plotter emulates the shipboard weapon system environment. Of major interest was the integration of the hardware components and the software developed in this study into a control of analog servo unit and a graphical display system.

Master of Science in
Computer Science
March 1981

Master of Science in
Electrical Engineering
March 1981

Advisors: U. Kodres
Department of
Computer Sciences

R. Panholzer
R. Baird
Department of
Electrical Engineering

A COMPUTER EVALUATION TECHNIQUE FOR EARLY SELECTION OF HARDWARE

Bart Dallas Hodgins
Lieutenant, United States Navy
B.S., University of Mississippi, 1973

There is a need for a decision making/early selection tool for use in the government computer selection process. Such early selection tools are critical to the decision maker due to the environment in which the government procurer is forced to operate. The instruction mix sensitivity techniques as demonstrated here has the potential to aid the government decision maker in evaluating the performance of that hardware without resorting to costly and time consuming techniques such as simulation or modeling.

Master of Science in
Computer Science
December 1980

Advisor: L. A. Cox, Jr.
Department of
Computer Science

COMPUTER PERFORMANCE PREDICTION OF A DATA FLOW ARCHITECTURE

David John Hogen
Lieutenant Commander, United States Navy
B.S.O.E., United States Naval Academy, 1972

Supercomputers capable of performing extremely high speed computation have been proposed which are based on an architecture known as data flow. Application of a Petri net-based methodology is used to evaluate the performance attainable by such an architecture. The architecture evaluated is being developed to execute the applicative programming language VAL.

Results show that for the data flow architecture to achieve its goal of high speed computation, intelligent multiprogramming schemes need to be developed. One such scheme, based on the notion of a "concurrency vector", is introduced.

Master of Science in
Computer Science
June 1981

Advisor: L. A. Cox
Department of
Computer Science

CONDITION RECOGNITION FOR A PROGRAM SYSTHEISIZER

Joseph Shawn Lape
Captain, United States Marine Corps
B.S., University of Louisville, 1975

and

Charles Wayne Miller
Captain, United States Marine Corps
B.S., Vanderbilt University, 1972

An enumeration algorithm which synthesizes programs from example computations is presented. The algorithm, originally proposed by Alan W. Biermann of Duke University, assigns a labelling of the instructions contained in an example trace consistent with producing minimum state Moore machine representations for the synthesized programs. Techniques for processing the information to reduce enumeration are given. Biermann's algorithm is extended by trace preprocessing techniques which identify and generalize conditions on instruction sequencing in the synthesized programs without the user's assistance. The techniques are presented using text editing as the domain, but are general enough to be extendable into other domains.

Master of Science in
Computer Science
June 1981

Advisor: D. R. Smith
Department of
Computer Science

AN INVESTIGATION OF SEVERAL BRANCHING FUNCTIONS IN A BRANCH
AND BOUND ALGORITHM FOR THE CHROMATIC NUMBER PROBLEMS

Ronald E. Rautenberg
Lieutenant Commander, United States Navy
B.S., University of Washington, 1970

The chromatic number problem is to determine the minimum number of colors to assign to the vertices of a graph such that no connected vertices are assigned the same color. This paper presents a branch and bound algorithm for the solution to the chromatic number problem and investigates five different branching functions. Additionally, a method of coloring very sparse graphs is presented which divides a graph into biconnected components and reduces the time required to color the graph.

Master of Science in
Computer Science
December 1980

Advisor: D. R. Smith
Department of
Computer Science

AN ADAPTATION OF THE ADA LANGUAGE FOR MACHINE GENERATED COMPILERS

Mark A. Rogers
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

and

Linda M. Myers
Lieutenant, United States Navy
B.S., State University of New York at Albany, 1972

The Ada language has been designated by the Department of Defense to replace the computer languages currently in use by the various services for tactical computer programs. This thesis modifies the Cornell Subset of Ada so that it is suitable for producing a LALR(1) grammar. Machine generated compiling tools such as LEX and YACC, available under the UNIX operating system, are then used to implement the scanner and the parser for this subset of Ada.

Master of Science in
Computer Science
December 1980

Advisor: B. J. MacLennan
Department of
Computer Sciences

NON-DISCRETIONARY SECURITY VALIDATION BY ASSIGNMENT

Lawrence Jay Shirley
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

The assignment technique is a simple mathematical method for determining that a computer protection mechanism is sufficient to enforce specific security policies. The intrinsically inseparable relationship between protection mechanisms and security policies is established.

Master of Science in
Computer Science
June 1981

Advisors: L. A. Cox
R. R. Schell
Department of
Computer Science

A CONCEPTUAL FRAMEWORK FOR GRAMMAR-DRIVEN SYNTHESIS

William R. Shockley
Lieutenant Commander, United States Navy
B.S., Massachusetts Institute of Technology, 1971

and

Daniel P. Haddow
Lieutenant, United States Navy
B.S., University of Washington, 1974

Conventional parsing techniques use grammars as embedded procedural knowledge bases in mechanisms which are capable of translating words in the language defined into equivalent parse trees. The approach described in this paper uses context-free grammars as data allowing access to synthesis templates which enable the user to create and interact with parse trees directly. The advantages of this approach are the utility of human-oriented grammars, the dynamic interchangeability of language definitions, immediate error rejection, and the ability to handle partially complete parse trees. The design for a prototype programming environment using grammar-driven synthesis is presented.

Master of Science in
Computer Science
December 1980

Advisor: B. J. MacLennan
Department of
Computer Science

ANALYTIC PERFORMANCE MODELING OF CONCURRENT
COMPUTER SYSTEMS BY STOCHASTIC PETRI NETS

Scott William Smart
Lieutenant, United States Navy
B.S., University of Wisconsin, 1975

Petri nets are presented as a technique for representing computer systems having asynchronous, concurrent operations. The structure of the nets are analyzed as a means of demonstrating the correctness of the modeled system. The execution of the petri net is considered as a stochastic process, allowing analysis of the model as a queueing network system by transforming the petri net into its stochastic equivalent net. It is shown that product form solutions for the state probabilities exist for the class of state machine decomposable nets but not for the more general class of consistent petri nets. Solutions for the corresponding open systems are derived by extending the petri net model to include arbitrary sources and sinks.

Master of Science in
Computer Science
June 1981

Advisor: L. A. Cox, Jr.
Department of
Computer Science

IMPLEMENTATION OF PROCESS MANAGEMENT FOR
A SECURE ARCHIVAL STORAGE SYSTEM

Anthony Ross Strickler
Captain, United States Army
B.S., United States Military Academy, 1973

This thesis presents an implementation of process management for a security kernel based secure archival storage system (SASS). The implementation is based on a family of secure, distributed, multimicro-processor operating systems designed to provide multilevel internal security and controlled sharing of data among authorized users. Process scheduling is affected by one half of a two level Traffic Controller that binds processes to virtualized processors. Inter-process communication mechanisms for synchronization, mutual exclusion, and message passing among processes are provided by utilization of eventcount and sequencer primitives. The implementation structure is based upon levels of abstraction and is loop free to permit future expansion to more complex members of the design family. Implementation was completed on the ADVANCED MICRO COMPUTERS Am 96/4116 AmZ8002 16 Bit MonoBoard Computer.

Master of Science in
Computer Science
March 1981

Advisor: R. R. Schell
Department of
Computer Science

DATA AND CONTROL STRUCTURES REQUIRED FOR ARTIFICIAL
INTELLIGENCE PROGRAMMING LANGUAGES

Cheron Rae Vail
A.B., Humboldt State University, 1974

This thesis investigates the requirements demanded of programming languages employed in Artificial Intelligence (AI) research. The primary focus is on the data structures and control structures implemented in a variety of AI languages, past and present. An appendix contains a discussion of the trend toward increased declarative capability in the AI languages. Another appendix presents a review of the design characteristics and major accomplishments of several AI applications systems.

Master of Science in
Computer Science
December 1980

Advisor: D. R. Smith
Department of
Computer Science

MASTER OF SCIENCE

IN

**COMPUTER
SYSTEMS
MANAGEMENT**

EVALUATION OF THE UTILIZATION OF RESEARCH AND DEVELOPMENT
RESULTS BY THE NAVAL FACILITIES ENGINEERING COMMAND

Michael Gresham Akin
B.S., Southwest Texas State University, 1969

and

Gerald Dwayne Nix
B.B.A., Texas A&I University, 1969

and

Gordon Ross Jefferson
Lieutenant Colonel, United States Marine Corps
B.S., University of Oregon, 1973

Every major command within the Department of Defense shares an acute interest in the cost effective utilization of research and development results in the field. The Naval Facilities Engineering Command's awareness of the frequently heard statement from the field, "We tell the laboratory what is needed in the field; why don't they research it?," resulted in a long-range program to enhance the organization's transfer of technology. This thesis is an effort to determine the following: Is relevant information being received in the field? How much is received? Why is it not received? The thesis also measures the progress made by NAVFAC over the past decade and examines methods to increase the technology reception capacity of the users.

The results of the study strongly indicate laboratory support has steadily improved during the past twelve years and the field organizations that utilize research results have a positive opinion of the laboratory and its research data.

Master of Science in
Computer Systems Management
September 1980

Advisor: J. W. Creighton
Department of
Administrative Sciences

MASTER OF SCIENCE

IN

ELECTRICAL ENGINEERING

ACOUSTOOPTICAL SPECTRUM ANALYSIS MODELING

Michael James Carmody
Lieutenant Commander, United States Navy
B.S., St. John's University, 1971

A summary of Bragg deflection theory and various approaches to direct detection acoustooptic spectrum analysis (AOSA) modeling is presented. A suitable model is chosen and extended to include the effects of diffraction efficiency, transducer efficiency, irradiance profiles of incident laser illumination, aperture size of the Bragg cell, and the acoustic attenuation experienced by the acoustic wavetrain generated by the input r-f signal. A Fortran program is developed to model the AOSA and predict the output image plane intensity profiles. A second version of the program includes a time variable permitting dynamic simulation of the system response.

Master of Science in
Electrical Engineering
June 1981

Advisor: J. P. Powers
Department of
Electrical Engineering

CONSTRAINED ADAPTIVE LEAST MEAN SQUARED FILTERS

Michael H. Davis
Lieutenant, United States Navy
B.S.E.E., University of Florida, 1972

The possibility of designing constrained adaptive finite impulse response digital filters is investigated as motivated by a study of adaptive noise cancellation. The first constraint considered consists of a fixed angle between filter zeros and is implemented in a master-slave approach in which one of the zeros is adjusted adaptively and the others follow subject to the constraint. The second constraint considered is a linear constraint on the filter weights and is implemented by augmenting the error equation with Lagrangean multipliers. Simulations indicate that the approach is feasible.

Master of Science in
Electrical Engineering
June 1981

Advisor: S. R. Parker
Department of
Electrical Engineering

THE DEVELOPMENT OF A BISTATIC ELECTROMAGNETIC SCATTERING LABORATORY
EMPLOYING TIME DOMAIN MEASUREMENT TECHNIQUES FOR IMPULSE RESPONSE
DETERMINATION AND TARGET CLASSIFICATION

Charles W. Hammond, Jr.
Captain, U. S. Marine Corps
B.S., United States Naval Academy, 1971

A time domain measurements, electromagnetic scattering laboratory has been developed to provide a means of experimentally measuring the transient, scattered electromagnetic fields from symmetric objects for impulse response determination or target classification. The evolution of the physical laboratory is described in terms of the development of the transmitting and receiving antennas, the interface of the data processing hardware, the signal processing scheme, the software routine functions, and the fabrication of scattering range targets.

The smoothed impulse response of a thin wire scatterer is experimentally determined, and a comparison of these measurements is made to a theoretical calculation of the response.

Master of Science in
Electrical Engineering
December 1980

Advisor: M. A. Morgan
Department of
Electrical Engineering

A MICROPROCESSOR DEVELOPMENT SYSTEM
FOR THE ALTOS SERIES MICROCOMPUTERS

Stephen Michael Hughes
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

An ALTOS series microcomputer is being used as the host computer in a microprocessor development system (MDS). The MDS hardware, consisting of the PRO-LOG STD bus, a Z80 cpu card, 2K bytes EPROM and 36K bytes random access memory, is controlled by the host via a single serial I/O port. The system provides the capability to develop and test both software and hardware in the combined CP/M (MP/M) and MDS environments.

Master of Science in
Electrical Engineering
June 1981

Advisor: M. L. Cotton
Department of
Electrical Engineering

COMPUTER INVESTIGATION OF VHF, UHF AND SHF FREQUENCIES
FOR MARINE CORPS PACKET RADIO USAGE

Thomas George Kane
Captain, U.S. Marine Corps
B.S.I.M., Purdue University, 1974

This thesis is a computer investigation of the VHF, UHF and SHF frequency bands for possible use by Marine Corps Packet Radio systems. It uses the STAR Terrain Model to analyze the different connectivity patterns that appear as the units of the Marine Amphibious Brigade move across the battlefield. The problem of enemy intercept of friendly traffic is also discussed and the units with a high probability of being intercepted are displayed pictorially.

Master of Science in
Electrical Engineering
December 1980

Advisor: J. M. Wozencraft
Department of
Electrical Engineering

UNITED STATES MARINE CORPS TACTICAL COMMUNICATION
ANTENNA SYSTEMS OPERATIONAL PARAMETERS

William Patrick Keogh
Captain, United States Marine Corps
B.S.E.E., University of New Mexico, 1974

The purpose of this analytical study was to develop useful computer models, using the Numerical Electromagnetic Code, for the VHF omnidirectional tactical antennas in the current inventory of the U.S. Marine Corps. The approach was to develop two basic models, one representing the RC-292 ground plane antenna, the other the MRC-109 vehicle mounted antenna system. With the solution of the current distributions on each of the models, calculations were made to analyze the impedance, gain and the associated radiation patterns for each of the antennas. Operation of these antennas over dissipative earth was also investigated.

Master of Science in
Electrical Engineering
December 1980

Advisor: S. Jauregui
Department of
Electrical Engineering

ADAPTIVE NOTCH FILTER SUPPRESSION OF BENDING MODES

William L. Marks
Commander, U. S. Navy
B.S.M.E., Iowa State University, 1966

A simple, microprocessor oriented algorithm is developed to identify track and suppress bending mode signals from a control system's rate and position feedback signals using adaptive digital notch filters. The algorithm can be used to suppress bending modes having center frequencies as close as one octave above the control system gain cross-over frequency without introduction of the excessive phase loss associated with conventional lowpass filtering techniques. A third order model of the trident missile autopilot pitch attitude control loop is contaminated with two dynamic, destabilizing bending modes and used as a concept demonstration model. The algorithm is demonstrated by stabilizing the pitch attitude loop in the presence of two bending modes with unknown gains, damping, center frequencies and rates of change of center frequencies.

Master of Science in
Electrical Engineering
December 1980

Advisor: R. D. Strum
Department of
Electrical Engineering

AN ADAPTIVE KALMAN IDENTIFIER AND
ITS APPLICATION TO LINEAR AND
NON-LINEAR ARMA MODELING

Leopoldo M. Mayoral
Lieutenant, United States Navy
B.S., University of Texas, 1974
M.S., Naval Postgraduate School, 1980

The problem of accurately replicating the parameters which define a given system for the purposes of *implementing modern control strategies* is important. Using an Autoregressive-Moving Average (ARMA) representation for the unknown system, a model is identified by processing input/output data to estimate the coefficients associated with the ARMA equation. Heretofore, identification of unknown system parameters can be identified explicitly. We call this approach the Adaptive Kalman Identifier (AKI).

It is shown that the Adaptive least mean square (LMS), Adaptive Recursive LMS and Adaptive Lattice filters are special suboptimal cases of the AKI. The convergence and modeling properties are compared with those of the AKI by simulation using various types of data.

With minor modification, the AKI algorithm was used to identify the linear and non-linear ARMA models of the phase locked loop (PLL). A discrete PLL using a forward Euler integration scheme was used as a source of non-linear data. The AKI technique appears to enable one to discern when a potential non-linear system enters into its non-linear mode of operation.

Master of Science in
Electrical Engineering
March 1981

Advisor: S. R. Parker
Electrical Engineering
Department

A FREQUENCY HOPPING SYNCHRONIZATION SYSTEM

Robert John McDevitt
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

Frequency hopping is one of several spread spectrum communication techniques of multipath interference. Synchronization of the frequency hopping transmitter and receiver is necessary in an operating system. This research concerns a method of synchronization whereby the receiver resynchronizes with the transmitter once each frequency hopping cycle. Thus, in most applications clock drift becomes negligible and continuity of data recovery is ensured. This report presents the principles and details of circuit design and operation.

Master of Science in
Electrical Engineering
December 1980

Advisor: G. A. Myers
Department of
Electrical Engineering

RADAR TARGET IMAGING BY TIME-DOMAIN
INVERSE SCATTERING

Meir Morag
Lieutenant Commander, Israeli Navy
B.S., Technion, Israel Institute of Technology, Haifa, 1970

This thesis describes the study and development of a workable inverse scattering method for imaging and identification of radar targets. The space-time integral approach is used for iterative target shape reconstruction.

Following an overview of transient electromagnetics, the integral equation is applied for thin-wire transient response computation.

The analytical time domain integral equation is derived and solved numerically for general conducting bodies of revolution. Finally, the algorithm for an inverse scattering computer solution is derived and tested under simulation of physical environments.

Master of Science in
Electrical Engineering
March 1981

Advisor: M. A. Morgan
Electrical Engineering
Department

REAL TIME SIMULATION AND CONTROL 3000 TON SURFACE EFFECT
SHIP WITH NEGATIVE DRAG CHARACTERISTICS IN SEA STATE

Lee Lewis Oliphant
Lieutenant, United States Navy
B.S., University of Texas, 1976

The model of a Surface Effect Ship was refined to include simplified propulsion dynamics, negative drag characteristics, sea state effects and an autopilot for speed control. These design modifications were introduced into a real time, man controlled simulation of a 3000 ton Surface Effect Ship (3K-SES) in 5 degrees of freedom (RTS5D) and results were compared with a Data Base Program (DBSIM5D) based on towing tank data scaled up to model the ship.

Hardware and Software design changes were incorporated into the RTS5D model to provide a more accurate approximation of real time, a faster computer interaction time, and a broach condition warning if the operator exceeded certain thrust vectoring limits.

Master of Science in
Electrical Engineering
December 1980

Advisor: A. Gerba, Jr.
Department of
Electrical Engineering

A DIGITALLY TUNED AM/FM RADIO

Dogan Ozdemir
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1980

and

Nurettin Bal
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1980

This report describes the design and operation of a relatively economical, single crystal, frequency synthesizer that generates the required local oscillator frequencies for commercial AM and FM broadcast receivers. Selection of a desired station is accomplished by electronic programming using pushbutton control. Fine tuning is not necessary. Receiver frequency drift is not significant because the local oscillator frequency is crystal controlled. Low-cost medium-scale integrated circuits and a large-scale integrated circuit (LSI) are the building blocks of this synthesizer.

Frequency synthesis techniques, elements of the system design and experimental results are also presented.

Master of Science in
Electrical Engineering
December 1980

Advisor: G. A. Myers
Department of
Electrical Engineering

DETAILED DESIGN AND IMPLEMENTATION OF
THE KERNEL OF A REAL-TIME DISTRIBUTED
MULTIPROCESSOR OPERATING SYSTEM

Demosthenis Konstantinos Rapantzikos
Lieutenant, Hellenic Navy
Greek Naval Academy, 1969

This thesis presents the detailed design and implementation of the kernel of a real-time, distributed operating system for a microcomputer based multiprocessor system.

Process oriented structure, segmented address spaces and a synchronization mechanism based on eventcounts and sequencers comprise the central concepts around which this operating system is built.

The operating system is hierarchically structured, layered in three loop free levels of abstraction and fundamentally configuration independent. This design permits the logical distribution of the kernel functions in the address space of each process and the physical distribution of system code and data among the microcomputers. This physical distribution in turn, in a multimicroprocessor configuration will help to minimize system bus contention.

The system particularly supports applications where processing is partitioned into a set of multiple interacting asynchronous processes. One such application is that of smart sensor image processing for which this system has been specifically developed. The implementation was developed for the INTEL 86/12A single-board computer using the 8086 processor chip.

Master of Science in
Electrical Engineering
March 1981

Advisors: T. F. Tao
Department of
Electrical Engineering

U. R. Kodres
Department of
Computer Science

APPLICATION OF THE NAVSTAR/GLOBAL
POSITIONING SYSTEM ON INSTRUMENTED RANGES

William L. Reinhart
Captain, United States Army
B.S.E.E., United States Military Academy, 1974

This report treats the application of the NAVSTAR/Global Positioning System as the Position/Location System in Real Time Casualty Assessment experiments. The desirable characteristics of a position/location system are listed. A current position/location system, the Range Measuring System, is used as a comparison reference for the Global Positioning System. Operation and parameters of the Global Positioning System are presented. A description and the results of a five day demonstration conducted on an instrumented range using a Global Positioning System prototype receiver are given. It is concluded that the Global Positioning System has some important advantages and that more study and further tests are needed to determine the full extent of its potential.

Master of Science in
Electrical Engineering
March 1981

Advisor: G. A. Myers
Department of
Electrical Engineering

TIME DOMAIN RADAR LABORATORY OPERATING SYSTEM
DEVELOPMENT AND TRANSIENT EM ANALYSIS

Ludwig A. Sorrentino
Lieutenant Commander, United States Navy
B.S.O.E., United States Naval Academy, 1971

An operator-microprocessor interactive Operating System has been developed for the Time Domain Radar Laboratory (TDRL). The Operating System performs signal acquisition and averaging, real time and frequency domain computations and provides outputs in easily evaluated graphic displays. Target classification is made by analysis of either impulse, step or ramp responses. A noise-reduction signal optimization technique is implemented. Numerous measurements of known and unknown targets are made using various antennas and results are compared to theory. Antenna parameters are established. Algorithms using the specialized features of the host Graphic System are tailored to the requirements of the TDRL for a detailed graphic presentation of processed data.

Master of Science in
Electrical Engineering
September 1981

Advisor: M. A. Morgan
Department of
Electrical Engineering

DATA ACQUISITION SYSTEM FOR USE IN THE
STUDY OF GEOMAGNETIC VARIATIONS

Hugh H. Thomas
Captain, United States Army
B.S., United States Military Academy, 1975

The study of the variations in the geomagnetic field requires a small, low power digital data acquisition system. This thesis describes the design of a digital data acquisition system for such use. The design uses the complementary metal-oxide-semiconductor (CMOS) version of the INTEL 8048 single chip microcomputer and a high density data recorder. The microcomputers do not take data internally, instead they route data over a separate data bus. Two intermediate data memories are used; alternating between being written onto by the acquisition circuit and being read from for writing to the data recorder.

Master of Science in
Electrical Engineering
December 1980

Advisor: R. Panholzer
Department of
Electrical Engineering

MASTER OF SCIENCE

IN

ENGINEERING ACOUSTICS

BACKSCATTER FROM A COMPOSITE ROUGH SURFACE

Wilson Banks Decker
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

Backscatter of acoustic signals generated by surfaces having point scattering and line scattering features is studied experimentally in air. Signals are analyzed for propagation over three models: a smooth plane wedge, a wedge whose surface is slightly roughened with uniformly-packed lead shot, and one randomly roughened with gravel. Scattering from the rough surfaces at normal incidence is measured to estimate the statistical parameters that describe the surface roughness. The returned acoustical parameters that describe roughness. The returned acoustic energy from the composite area of rough surface and wedge for low grazing angles is analyzed to determine whether the identity of the two individual backscatter effects can be separated in their combined spectrum. The near grazing backscattered amplitudes are much larger than predicted by conventional rough surface scattering theory and suggest the presence of a backscattered boundary wave.

Master of Science in
Engineering Acoustics
December 1980

Advisor: H. Medwin
Department of
Physics and Chemistry

THE PROPAGATION OF A SCATTERED ACOUSTIC
BOUNDARY WAVE OVER A ROUGH WEDGE

Stephen Joe Hollis
Lieutenant, United States Navy
B.S., Southwest Missouri State University, 1972
M.S., George Washington University, 1978

The theory for the generation of a scattered acoustic boundary wave over a slightly rough planar surface was developed by I. Tolstoy in 1979. In the present experiment the propagation of the boundary wave over a wedge is studied. It is found that the boundary wave and the geometrically spreading volume wave diffract from the crest in the same manner. The amplitude ratio of the boundary wave to the diffracted volume wave, where the growth of the boundary wave from the crest is due to a phased line source at the crest caused by the diffracting volume wave, was found to have an average frequency dependence, f^2 , and an average range dependence, $R^{+0.5}$. The amplitude ratio of the boundary wave to diffracted volume wave due to propagation over the rough wedge gave an average frequency dependence of f^2 and an average range dependence of $R^{0.3}$. Low wave number grazing propagation over a wedge produces a boundary wave whose amplitude can be many times that of a diffracted volume wave for a smooth surfaced wedge.

Master of Science in
Engineering Acoustics
December 1980

Advisor: H. Medwin
Department of
Physics and Chemistry

ACOUSTIC DIFFRACTION BY A FINITE BARRIER:
THEORIES AND EXPERIMENT

Gary M. Jebsen
B.S., Florida Atlantic University, 1969

The Biot-Tolstoy (B-T) exact impulse solution of diffraction by an infinite half-plane is compared to the usual Helmholtz-Kirchhoff (H-K) integral formulation and to the exact continuous wave (CW) solution of Macdonald. For backscatter, the B-T and H-K solutions are found to differ significantly, especially near the surface of the half plane where the B-T solution gives close agreement with experiment. For forward scatter, the two exact solutions and experimental data are in agreement. B-T is found to agree well with measurements of diffraction by a barrier perpendicular to a rigid base. By considering source and source image in the base separately, the concept of "image of the source in the barrier" is found to be unnecessary. Use of the time domain form of the B-T solution in calculating the forward diffraction near a corner and behind a thin strip is shown to give results which agree well with measured data. Secondary diffraction effects are observed in the measurements of diffraction by a thin strip, a non-vertical barrier and a thick edge.

Master of Science in
Engineering Acoustics
March 1981

Advisor: H. Medwin
Department of
Physics and Chemistry

ACOUSTIC BOUNDARY WAVE GENERATION AND SHADOWING AT A SEAMOUNT

Edgar Alvin Jordan
Lieutenant, United States Navy
B.S. Physics, Weber State College, 1974

The interaction of a sound field and a seamount has been studied by physically modeling the ocean surface over 2 dimensional and 3 dimensional models of Dickens Seamount. By using a smooth ocean surface, and one with a surface of scaled Rayleigh roughness to model a 35 knot wind, the relative contributions are determined for off-axis scattering elements, multiple reflection from the ocean surface, and diffraction over the crest of the seamount.

Boundary wave generation over a randomly rough plane surface is studied experimentally. The ratio of boundary wave amplitude to volume wave amplitude is found to be proportional to (frequency)^{3/2} and (range)^{1/2} and the ratio of the empirical scattering parameter to the rms height of the roughness elements is found to be approximately 0.3. The spatial correlation length of the randomly rough surface takes the place of the center-to-center separation of the hemispherical bosses used in Tolstoy's theoretical treatment.

Master of Science in
Engineering Acoustics
June 1981

Advisor: H. Medwin
Department of
Physics and Chemistry

EXPERIMENTAL STUDY OF NOISE PRODUCED BY
AN UNDERWATER ACOUSTIC BUBBLE SCREEN

Clark Thomas Kelley
Lieutenant, United States Navy
B.S.M.E., Auburn University, 1974

Measurements in the Naval Postgraduate School's anechoic water tanks were conducted to determine the acoustic noise in the frequency range twenty hertz to ten kilohertz associated with injecting air into the tank through perforations in a two inch diameter PVC pipe. The effective source level for a pipe having several rows of smaller holes is ten to fifteen decibels smaller over most of the band than for a pipe having a single row of holes which produces the same flow rate. The measurements also indicate that the dominant source of noise is that associated with bubble formation and that the second most important source is from ascending bubbles. The impetus for this work was to study various aspects of the problem of designing a sound insulating bubble screen for the Carr Inlet Range of the Puget Sound Naval Shipyard.

Master of Science in
Engineering Acoustics
June 1981

Advisor: O. B. Wilson, Jr.
Department of
Physics and Chemistry

ON THE DESIGN OF AN ACOUSTICALLY ISOLATING BUBBLE
SCREEN FOR THE CARR INLET ACOUSTIC RANGE

Kenneth William Marr
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

The theoretical acoustic behavior of an underwater bubble screen was examined using Rayleigh reflection theory. A microcomputer model simulates the acoustic impedance mismatch at the interfaces of an ideal, bubble screen. A sensitivity analysis indicates that the angle of incidence of sound energy and the speed of sound in the layer are the most important screen properties for predicting the insulating capability of a bubble screen. In the neighborhood of frequencies for which the screen thickness is an integral number of half wavelengths, the interference results in a reduced reflection coefficient and a corresponding increase in transmission through the screen. So that for a broad band spectrum wide enough to cover a number of such frequencies, the attenuation to be expected exceeds 10 dB only over about 90 percent of the spectrum. The interest for this work came from the need for a noise insulating screen at the Carr Inlet Acoustic Range.

Master of Science in
Engineering Acoustics
June 1981

Advisor: J. V. Sanders
Department of
Physics and Chemistry

THE EFFECT OF SCATTERING AND ABSORPTION ON NOISE FROM A
CAVITATING NOISE SOURCE IN THE SUBSURFACE OCEAN LAYER

Yngvar Dag Tronstad
Commander, Norwegian Navy
Marine Engineer, Norwegian Naval Academy, 1969

When investigating the detection performance of a passive homing torpedo used against shallow draft surface ships, certain environmental factors such as the rough sea surface and the bubble-dominated inhomogeneous layer near the sea surface have to be considered. This thesis attempts to gain some insight into the behavior of a homing torpedo system during its critical attack phase, as well as getting some indications of the relative importance of the scattering mechanisms and the induced tactical limitations. An idealized propagation model was used as reference of comparison. For a given sea state and target speed the results stress the importance of having a search depth below the bubble-dominated subsurface layer, and a variable speed capability during the torpedo's attack phase.

Master of Science in
Engineering Acoustics
June 1981

Advisor: K. E. Woehler
Department of
Physics and Chemistry

A SIGNAL PROCESSING ALGORITHM BASED ON MULTIPLE MICROPROCESSORS
FOR AN UNDERWATER ACOUSTIC IMAGING SYSTEM

Guy Ronald Arthur Vermander
Captain, Canadian Forces
B.S., Royal Military College of Canada, 1966

An algorithm has been designed to provide near real-time location and classification information to an operator of an underwater acoustic imaging system. The overall system to detect objects buried up to five meters in unconsolidated marine sediments consists of a specialized projector co-located with a five meter receiving line array. This system is described in basic terms together with the principles of the signal processing that extracts information from the scattered acoustic signals. Using simulated objects, the angular resolution and imaging performance of a number of system designs were evaluated. To obtain near real-time execution, the algorithm was optimized and partitioned using parallel, pipeline, and double buffering techniques for independent but synchronized operation on multiple microprocessors. The feasibility of the design approach was experimentally demonstrated using four single board computers in a micro-computer development system.

Master of Science in
Engineering Acoustics and
Computer Science
December 1980

Advisor: G. L. Sackman
Department of
Electrical Engineering

MASTER OF SCIENCE

IN

ENGINEERING SCIENCE

A COMPARISON OF COMPUTER WARHEAD-TARGET ENDGAME SIMULATION
AND RECOMMENDATIONS PERTAINING TO FUTURE ENDGAME PROGRAMS

Christopher Kenneth Fair
Lieutenant, United States Navy
B. A., University of Washington, 1975

This study involves a description of several computer warhead-target Endgame simulations currently in use at various research facilities throughout the country. A comparison of the techniques and methods used in these programs is included. Recommendations and discussion concerning a desirable format for future computer Endgame simulations are included.

In addition, as a part of this effort, the Endgame program SCAN has been installed on the Naval Postgraduate School's IBM 3033 Computer System, and a Users Manual for the use of this program has been prepared.

Master of Science in
Engineering Science
June 1981

Advisor: R. E. Ball
Department of
Aeronautics

AN INVESTIGATION OF THE COMBUSTION
PROCESS IN SOLID FUEL RAMJETS

William Vernon Goodwin
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

An experimental investigation was conducted into four areas of the solid fuel ramjet combustion process: (1) the effects of near-wall turbulent mixing and equivalence ratio on combustion efficiency, (2) the effects of bypass air on combustion efficiency, (3) the combustion process in a cylindrically perforated fuel grain with a twin side-dump/dome configuration, and (4) the comparison of experimental radial temperature profiles to computer generated radial profiles.

Polymethylmethacrylate fuel grains were burned in a ramjet motor on a thrust stand. Combustion efficiencies were determined and compared for different configurations. It was found to be insensitive to variations in the mixture ratio and to near-wall mixing. Bypass air was found to adversely affect the combustion efficiency both in stable and unstable combustion environments. The twin side-dump/dome configuration was unable to sustain combustion for all conditions investigated. Theoretical radial temperature profiles were found to have larger near wall gradients than were measured experimentally.

Master of Science in
Engineering Science
June 1981

Advisor: D. W. Netzer
Department of
Aeronautics

A USER'S MANUAL AND PROGRAM DESCRIPTION OF SEA PLOT: A
THREE-DIMENSIONAL GRAPHICS PROGRAM DEPICTING A WAR-AT-SEA
ENCOUNTER BETWEEN A SINGLE SHIP AND A SINGLE AIRCRAFT

Gray DeVeaux Hobby
Lieutenant Commander, United States Navy
B.S.M.A., Purdue University, 1972

SEA PLOT is a three-dimensional graphics program written for the Compass Hammer research effort. The program portrays a war-at-sea scenario in which a single aircraft attacks a single ship target located at the origin of an earth-fixed coordinate system. To plot the three-dimensional scenario on a two-dimensional plotting surface, a conic projection technique is used in which a cone of vision is generated based on the position of a viewer's eye. The position of the eye is automatically placed upon the initial coordinate position of the attacking aircraft. The program is written using VERSATEC software available on the NPS IBM 3033 computer. However, the program has been structured in such a manner as to permit easy transition to a more sophisticated, picture oriented, graphics language such as PLOT 80 which would permit an interactive graphics employment of the program and possibly animation of the attacking scenario.

Master of Science in
Engineering Science
June 1981

Advisor: R. E. Ball
Department of
Aeronautics

CONTROL OF AIRFLOW ABOUT A HIGH ENERGY LASER TURRET

Alan Michael Mandigo
Lieutenant, United States Navy
B.S.M.E., Lowell Technological Institute, 1974

A high energy laser system inflicts damage on a target by radiating large amounts of thermal energy onto a small area. Airflow about the laser turret, which is located on top of the aircraft fuselage, is unsteady and causes problems in beam control. The problems are jitter, which is vibration of the laser beam, and optical path distortions.

The theory of flow around a cylinder and around a sphere was examined, and several airflow control techniques were screened in an effort to suppress the unsteadiness of the flow. A fairing and turret base suction apparatus was selected and experimentally tested in a wind tunnel.

During the course of the experiments several parameters were varied as follows: blower flow rate, spacing between turret and fairing nose-piece, and flow rate in five separate ducts. Results of the test indicate that the fairing and base suction technique eliminates the unsteadiness. Further research and testing are required to develop the technique for actual use on aircraft.

Master of Science in
Engineering Science
December 1980

Advisor: A. E. Fuhs
Department of
Aeronautics

PERFORMANCE OF AN OSWATISCH INLET WITH HEMISPHERICAL
CENTERBODY AT ZERO ANGLE OF ATTACK

John Francis Moran
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

This thesis analyzes the performance of a ramjet with an Oswatich inlet using a blunt centerbody and compares performance to a baseline ramjet using an inlet with a conical spike at Mach 3.0.

Inlet performance as a ratio of inlet lip to nose centerbody ratio, r_L/r_n , is developed. The capture streamline for each ratio is determined and the coefficient of additive drag is calculated as a function of r_L/r_n . Setting thrust coefficient equal to coefficient of drag, the performance of two ramjets is determined. One ramjet is the baseline with a spike inlet; the other ramjet uses the blunt centerbody.

Ramjets and inlets are compared on the basis of specific fuel consumption, excess thrust coefficient and specific thrust. For the ramjet with blunt centerbody, performance parameters were calculated as a function of inlet lip radius to nose centerbody radius. Also compared is the effect of the ratio, r_L/r_n , on relative detection range. For both types of ramjets, the detection range is reduced by approximately 66%. Performance of the ramjet with blunt nosed centerbody is severely handicapped due to high additive drag and poor pressure recovery. Specific fuel consumption is approximately 50% greater for the ramjet with the blunt centerbody compared to the ramjet with the spike inlet.

Master of Science in
Engineering Science
June 1981

Advisor: A. E. Fuhs
Department of
Aeronautics

ATTACK VS. SCAN: A COMPARISON OF ENDGAME
AIRCRAFT SURVIVABILITY COMPUTER PROGRAMS

James Earl Parr
Lieutenant, United States Navy
B.S., University of Utah, 1975

This study compares two computer programs, ATTACK and SCAN, with respect to the utility and validity of each program. The comparison is made from two points of view; a model developer and a consumer.

The utility considers six subject areas; (1) Documentation, (2) Geometric modeling, (3) P_K /Vulnerable area modeling, (4) Missile, Warhead and Fuze Modeling, (5) Scenario Simulation and (6) Program Output. SCAN was determined to be superior in every area except for the missile, warhead and fuze modeling area.

For the validity evaluation, equivalent models were developed for a shoe box target and a simple warhead for both programs. A separate manual plot technique was used to verify the program results. For the sample models used in the comparison, the results agreed qualitatively with those from the plot technique.

Master of Science in
Engineering Science
December 1980

Advisor: R. E. Ball
Department of
Aeronautics

FLOW CONTROL ABOUT AN AIRBORNE LASER TURRET

James Robert Schonberger
Lieutenant, United States Navy
B.S., North Dakota State University at Fargo, 1973

A high-energy laser system inflicts damage on a target by radiating large amounts of thermal energy onto a small area. Airflow about the laser turret housed on top of an aircraft is unsteady, and causes problems in beam control. These problems are jitter, which is vibration of the laser beam, and optical path distortions.

The theory of flow around a cylinder and around a sphere was examined, and several airflow control techniques were investigated as possible means of suppressing the unsteadiness of the flow. A fairing and turret-base suction apparatus was selected, and was experimentally tested in a wind tunnel.

During the course of the experiment, several parameters were varied, as follows: blower flow rate, spacing between turret and fairing nose piece, and flow rate in five separate ducts. Results of the tests utilizing the tapered symmetric nose piece indicate that the fairing and base-suction technique eliminates the unsteadiness. Further research and testing are required to develop this technique for actual use on aircraft.

Master of Science in
Engineering Science
December 1980

Advisor: A. E. Fuhs
Department of
Aeronautics

COMPUTER PROGRAM APPLICATIONS TO TACTICAL MISSILE CONCEPTUAL DESIGN

Martin David Sullivan
Lieutenant, United States Navy
B.S., Georgia Institute of Technology, 1975

This thesis is comprised of four independent computer programs and their related operating instructions. Each of these programs focuses on a particular facet of tactical missile design. The topics covered include guidance and trajectory calculations, rocket motor propulsion sizing, warhead design, and aerodynamic coefficient determination. The programs are developed from accepted mathematical procedures and are tailored to optimize operator interaction for educational purposes. This thesis is intended to be utilized as a supplement to the thesis Tactical Missile Conceptual Design by D. R. Redmon, Naval Postgraduate School, September 1980.

Master of Science in
Engineering Science
June 1981

Advisor: G. H. Lindsey
Department of
Aeronautics

WARHEAD PARAMETRIC STUDIES AGAINST A GENERIC CRUISE MISSILE

Peter W. Taylor
Lieutenant, United States Navy
B.S., Florida Technological University, 1972

This study utilizes the SCAN computer program to determine the overall effectiveness of a fragmentation warhead against a generic cruise missile target. The objective of the SCAN program is to predict the probability that a target will survive an attack by a missile armed with a fragmentation warhead. Several warhead parameters were investigated, including warhead radius, explosive weight, fragment size and warhead spray pattern. The P_k is presented in various figures and tables, where it is discussed in relation to miss distance, triggering position, elevation and pitch angles, warhead radius, and fragment size. The computer data resulting from the many runs of the SCAN program considered here is a helpful tool for the warhead designer, or student of warhead design, since it can give guidance on the selection of many of the crucial parameters that make the warhead effective against a given target.

Master of Science in
Engineering Science
December 1980

Advisor: G. H. Lindsey
Department of
Aeronautics

ANALYSIS AND WIND TUNNEL TEST OF A STATIC PRESSURE PROBE USED
TO SENSE ALTITUDE THROUGH MEASUREMENT OF STATIC PRESSURE

Kenneth Delmer Tillotson
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

A static pressure probe was tested to determine the feasibility of using the probe, as an integral part of a missile nose, to sense missile altitude. Experiments were conducted at Mach 2.0 and at Mach 1.51.

At Mach 2.0, the static pressure probe will perform within altitude specifications of 25,000 feet \pm 2,000 feet at angles of attack ranging from - 8 to + 8 degrees. At Mach 2.0, within an angle-of-attack ranging from 0 to 6 degrees, the probe will measure free stream static pressure within 4 percent; a 4 percent error in measurement is equivalent to an altitude error of 900 feet. The missile nose shock will remain downstream of the probe pressure ports for flight Mach numbers above 1.5.

Master of Science in
Engineering Science
December 1980

Advisor: A. E. Fuhs
Department of
Aeronautics

MASTER OF SCIENCE

IN

INFORMATION SYSTEMS

EMPIRICAL ANALYSIS OF SYSTEMATIC COMMUNICATIONS ERRORS

Timothy Born
Captain, United States Marine Corps
B.S., United States Naval Academy, 1975

This study is concerned with the causality of systematic communication errors encountered in Marine land combat operations in Vietnam. Source data was compiled from an examination of after-action reports maintained at USMC Archives, Washington, D.C.. The fundamentals of Information and Communication Theory are explored first, in an effort to understand the phenomena (psychological and physiological capabilities and limitations) affecting the "human link" in information and communication systems. This background served as the foundation regarding the development of a suitable communication error model to explain the anomalies encountered in human behavior in military operations of high intensity. From this model, inferences were made regarding the practicality of implementing Decision Support Systems to eliminate the systematic communication errors discovered.

Master of Science in
Information Systems
September 1981

Advisor: R. H. Weissinger-Baylon
Department of
Administrative Sciences

FEASIBILITY OF NEW SELECTION CRITERIA FOR THE VILLARD C. SLEDGE AWARD

Richard A. Clute
Captain, United States Marine Corps
B.B.A., Western Michigan University, 1973

The Villard C. Sledge Memorial Maintenance Award is a valuable tool to maintain maintenance excellence and morale within the naval aviation community. This annual award is given to selected Intermediate Maintenance Activities for each model engine within each degree of maintenance.

This thesis evaluates the data sources used in the selection of the award, including those from organizational through intermediate level maintenance. The use of the three degree maintenance concept in the evaluation is discussed. The Maintenance Data System is described with emphasis on the data flow.

It is concluded that the award criteria for selection is satisfactory at this time and should only be changed by reducing the number of engines inducted for First and Second Degree maintenance in the selection criteria.

Master of Science in
Information Systems
June 1981

Advisor: J. W. Creighton
Department of
Administrative Sciences

PREPARING FOR PHASE II: A GUIDE TO THE PAY/PERSONNEL ADMINISTRATIVE
SUPPORT SYSTEM (PASS) SOURCE DATA SYSTEM (SDS) SITE PREPARATION
PROCESS FOR PASS FIELD MANAGERS

Janet Elaine Craig
Lieutenant, United States Navy
B.A., California State University, Northridge, 1972

This thesis presents an initial orientation and general overview of the physical and managerial aspects of the field level site preparation process for the Source Data System (SDD), the automated distributed process system which will implement Phase II of the Pay/Personnel Administrative Support System (PASS). It describes a systematic approach to terminal and printer requirements and allocation analysis, configuration design, and management of field level site preparation activities for selected configuration. Forms and checklists developed by the author to implement the approach are described and explained in the main body of the thesis and include as Appendices.

While the thesis specifically addresses the PASS/SDS system, the approach, forms and checklists developed could easily be adapted for use in supporting remote entry level site preparation involved in any distributed processing system.

Master of Science in
Information Systems
June 1981

Advisor: N. R. Lyons
Department of
Administrative Science

AN MIS FRAMEWORK FOR ANALYZING THE ORGANIZATIONAL
IMPACT OF MANAGEMENT INFORMATION SYSTEMS PROJECTS

Dennis J. Egan
Lieutenant Commander, United States Navy
A.B., Rutgers The State University, 1969

The U.S. Navy's Shipboard Non-tactical ADP Program (SNAP II) is a proposed shipboard management information system (MIS). By first building a basic MIS framework using a simple organizational information system model and developing certain general measures of an MIS project's impact, the SNAP II project is analyzed. The framework allows the investigation of MIS impact at specific organizational levels. The effect of unevenly distributed impact at specific levels can be significant with regard to the overall value of the MIS. This impact might not be anticipated by analysis of the MIS project through the use of total organizational impact alone. The analysis of the SNAP II project reveals two areas of concern. First, the SNAP II system is not a true independent shipboard MIS. Second, there are potentially detrimental undisplaced impacts, focused at the lower levels of the shipboard organization, which may result from implementation of SNAP II.

Master of Science in
Information Systems
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Advisor: S. J. O'Hare
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Administrative Science

DESIGN OF A DATA BASE MANAGEMENT SYSTEM FOR
STUDENT PROGRAM DEVELOPMENT AND MAINTENANCE

Kenneth Mathew Golaszewski
Lieutenant, United States Navy
B.S., S.U.N.Y. Maritime College, 1974

The purpose of this thesis is to develop a data base orientated system that aids the Academic Associates and Curricular Officers in program development and course selection for individual students within particular curricula. The data base system is written utilizing the Virtual Machine Facility/370 (VM/370) operating system and the IBM 3033 computer at the Naval Postgraduate School. The automation of student curriculum matrices, course offerings, and tentative course scheduling is presented. A system user's manual for the IBM 3278 terminal is provided.

Master of Science in
Information Systems
June 1981

Advisor: N. F. Schneidewind
Department of
Computer Science

AN EXAMINATION OF PROJECT MANAGEMENT AND CONTROL
REQUIREMENTS AND ALTERNATIVES AT FNOC

Charlotte Ruth Gross
Lieutenant, United States Navy
B.S., University of Minnesota, 1968
M.S., University of Southern California, 1979

The need for a project information and control system at FNOC was examined. Personal interviews and checklists were used to determine user requirements. Several manual and automated alternatives were presented. The author concluded that the purchase of a software package, would in all probability, be the most efficient and effective alternative. Several packages were evaluated and 3 packages were finally presented for more extensive review by FNOC staff.

Master of Science in
Information Systems
June 1981

Advisors: N. R. Lyons
C. Jones
Department of
Administrative Sciences

THE INDIVIDUAL VERSUS THE COMPUTER: AN EXAMINATION OF ATTITUDE
PROBLEMS AND THEIR IMPACT ON SYSTEM DEVELOPMENT

Gayle Jean Plato
Lieutenant, United States Navy
B.A., University of California, Berkeley, 1973

Whether rational or irrational in nature, negative feelings toward computer based systems have been a persistent problem for computer implementors and systems managers for many years. People may sometimes fear for the future of their employment, feel intimidated by a technology they do not understand, resent the invasion of privacy associated with indiscriminate data collection, or exhibit a wide variety of other emotional responses.

In order to better anticipate, understand and cope with the multitude of emotional reactions and interface problems that potentially may develop among non-technical computer system users, current literature pertaining to such negative attitudes has been explored. With a greater understanding of possible human-computer interface problems, it is believed that managers, computer professionals, system users and social institutions alike can all assume important roles in helping to promote more universally positive interactions and attitudes in the future.

Master of Science in
Information Systems
June 1981

Advisor: N. R. Lyons
Department of
Administrative Sciences

THE APPLICABILITY OF UADPS-SP TO A DEMS ENVIRONMENT

Roderick R. Robertson
Lieutenant Commander, Supply Corps, United States Navy
B.A., West Virginia University, 1972

This thesis addresses some of the benefits which may be gained from changing UADPS-SP to a Data Base Management System (DBMS). Some of these benefits include a reduction of training time for newly arrived personnel, an improved monitoring of in-house shipping-receiving functions and status, and a reduction in the delay time for queries and program changes.

The thesis further examines some of the possible problems which may be encountered with UADPS-SP when Data Base Management Systems are installed without any prior planning. The lack of planning contributes significantly to costs overruns. The factors which affect costs include training personnel about UADPS-SP and Data Base Management System concepts, and the rewrite of all or part of the current existing files.

Master of Science in
Information Systems
June 1981

Advisor: N. F. Schneidewind
Department of
Administrative Sciences

AN INFORMATION SYSTEM FOR THE
PERUVIAN AIR FORCE HOSPITAL

Juan Saona Nunez del Prado
Lieutenant Colonel, Peruvian Air Force
B.S., Peruvian Air Force Academy, 1962

The purpose of this project/thesis is to define the preliminary study of a hospital information system for the Peruvian Air Force Hospital. It is written with the intention of giving to the Peruvian Air Force staff, and also to the hospital manager, an idea of the meaning of a Hospital Information System. In addition, the project/thesis describes how it would work and which would be the best system to be implemented. The last part of this project/thesis describes some of the positive and negative effects and reaction for the personnel that will be involved in this system.

Master of Science in
Information Systems
June 1981

Advisor: N. R. Lyons
Department of
Administrative Sciences

THE MESSAGE PROCESSING AND DISTRIBUTION SYSTEM DEVELOPMENT

Kenneth Lee Whitten
Lieutenant, United States Navy
B.A., University of South Alabama, 1973

This thesis provides a critical analysis of the Navy's Message Processing and Distribution System (MPDS) development. A historical approach is used in presenting the system's life cycle development beginning with the planning phase and ending with the integrated logistic support phase. Several maintenance problems which occurred after the system was accepted for Fleet use were examined to determine if they resulted from errors in the acquisition process. The underlying intent of the thesis is to use the MPDS to examine the critical decision points of the acquisition process and offer constructive recommendations for avoiding the problems which hindered the successful development of this system.

Master of Science in
Information Systems
June 1981

Advisor: L. Cox
Department of
Computer Science

MASTER OF SCIENCE

IN

MANAGEMENT

AN ANALYSIS OF THE U.S. NAVY ENLISTED SEPARATION QUESTIONNAIRE

Roger C. Adams
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

This thesis reports a factor analysis of the U. S. Navy Enlisted Separation Questionnaire, using respondent data from the second quarter (January-March) of fiscal year 1980. The objectives and uses of this questionnaire by the Navy are discussed and the factor analysis methodology is developed. The questionnaire data are then analyzed, constrained originally to the initial categories used by the Navy, and then unconstrained as to a specific number of factors. The relationship of the individual attitudinal dimensions to the composition of these factors is then discussed. The findings reconfirm the fact that perceptions concerning pay/compensation, family separation and job dissatisfaction are strongly related to the decision to leave the Navy.

Discriminant analysis, discriminating between those personnel given desirable reenlistment codes and those given undesirable reenlistment codes, was also performed. The results of these analyses reveal that the initial nine categories, used as the independent variables in the discriminant functions, have moderate discriminating potential. More importantly, the discriminant coefficients strongly support the significant loadings reported in the factor analyses.

Finally, it is concluded that the results from the Navy Enlisted Separation Questionnaire could be effectively described by three common factors rather than the nine categories currently used, and that redundancy in the items could be removed.

Master of Science in
Management
June 1981

Advisor: R. S. Elster
Department of
Administrative Sciences

A "SINGLE AUDIT" MODEL FOR FEDERAL CREDIT UNIONS

Richard Dale Allen
Major, United States Marine Corps
B.S., Southwestern State College, 1970

This thesis explains the basic operations of a Federal credit union, describes the role of internal auditing, reviews the internal audit function of cooperatives, and explores the potential benefits of a "single audit" program for credit unions. An auditing model is developed with sub-programs to review fiscal administration, property management, procurement, personnel, and the operational activities of a Federal credit union. The model contains preferred practices of the National Credit Union Administration and key control points to be verified by the internal auditor. A segment of the model is utilized in a management audit of a local cooperative to test its usefulness and flexibility. Conclusions and recommendations are then provided on the case for a "single audit" model as well as testing and evaluation procedures for the model to ensure enhancement of the internal audit function in Federal Credit unions.

Master of Science in
Management
June 1981

Advisor: R. A. Bobulinski
Department of
Administrative Sciences

DOD PROFIT POLICY: ITS EFFECTIVENESS--THE CONTRACTING OFFICER'S VIEW

Thomas Perry Anderson, IV
Lieutenant, Supply Corps, United States Navy
B.S., University of Missouri, 1974

The purpose of this thesis was to seek out the opinion of the Procurement Contracting Officers within the Department of Defense as to their perceptions of the effectiveness of DOD's Profit Policy. This was accomplished by means of a questionnaire sent to PCO's at 25 major buying commands within DOD. The results of the survey showed that PCO's felt that (1) profit policy was ineffective in incentivizing contractor investment; (2) facilities capital and the productivity reward were having little or no effect on contractor investment; (3) program instability and the impact of socio-economic programs on the contracting process were major contributors to profit policy's ineffectiveness; (4) DOD Profit Policy did not have a high priority in their organizations.

Recommendations are made concerning methods for improving profit policy and for additional study.

Master of Science in
Management
December 1980

Advisor: M. L. Sneiderman
Department of
Administrative Sciences

PATIENT SATISFACTION: AN EXAMINATION OF THE CONCEPT
AND PRESENTATION OF A STRATEGIC APPROACH FOR ITS
ASSESSMENT AND USE WITHIN A HEALTH CARE SYSTEM

Mark Ernest Babbitt
Lieutenant, Medical Service Corps, United States Navy
B.S., Southern Illinois University, 1979

Recent years have seen increased attention being devoted to issues relating to quality of medical care and its evaluation. The evaluation methods currently being used are technically based and are conducted essentially by the same groups which provide the care. An alternative approach and one which provides a contrasting perspective to the technical evaluation is that which determines the extent to which patients are satisfied with the care received.

This study examines the concept of patient satisfaction and the manner in which patients assess medical care and services. The desirability of the dual perspective of both providers and patients in the assessment of medical care and services is supported and a problem-oriented methodology which is adaptable to the various levels within a health care system is presented. An indirect test of the methodology which utilizes the opinions of a sample of physicians is presented and its findings appear to validate the methodology and indicate a relatively high potential for physicians' acceptance of this approach.

Master of Science in
Management
June 1981

Advisor: R. T. Harris
Department of
Administrative Sciences

CONTRACTING WITH NATO INDUSTRY: U.S. OR
FOREIGN PROCUREMENT REGULATIONS?

William R. Bell
Lieutenant Commander, Supply Corps, U.S. Navy
B.S., University of Richmond, 1972

The U.S. Department of Defense policy on NATO standardization requires all major defense procurement be reviewed for standardization with NATO and whenever possible codevelopment/coproduction programs be initiated with NATO nations. Presently, U.S. procurement regulations dominate these joint efforts. However, existing international programs have experienced an increasing reluctance on the part of participating NATO nations to accept U.S. procurement regulations. Instead, these nations desire to apply their own procurement regulations to their domestic industries.

This study identifies the problems experienced by the acquisition manager and U.S. industry on multinational programs resulting from the use of foreign procurement regulations and examines their implications for the Department of Defense's future acquisition policy. The study concludes that when the United States is the contracting nation, U.S. procurement regulations should be applicable to both domestic and foreign contractors.

Master of Science in
Management
September 1981

Advisor: E. J. Laurance
Department of
National Security Affairs

COST ALLOCATION PLANS FOR MUNICIPALITIES FOR
INTERNAL MANAGEMENT AND GRANT PROGRAMS

Barron Ray Benroth
Lieutenant Commander, United States Navy
B.S., Mississippi State University, 1966

and

Robert Francis Fremont III
Lieutenant Commander, United States Navy
B.S., United States Merchant Marine Academy, 1971

This thesis is a discussion of and presentation of cost allocation plans for municipal governments for internal management and Federal grant reimbursement purposes. The authors present information concerning the current state of the art in cost accounting for cost allocation including classification of cost, responsibility accounting and various cost allocation methodologies. The authors discuss the application of Federal rules, regulations and guidelines to grants with emphasis on allowable and unallowable cost, audit requirements and responsibilities and the single audit concept.

The authors develop and present two cost allocation plans utilizing data and information from a municipality; the City of Monterey, California. The first plan is for internal management purposes for supporting pricing and fee for service decisions. The second plan is applicable to Federal grants for the reimbursement of "eligible" indirect costs.

The authors contend that municipalities can benefit from the preparation of a cost allocation plan even though some argue against cost allocation outside the "private" sector.

Master of Science in
Management
March 1981

Advisor: R. A. Bobulinski
Department of
Administrative Sciences

ECONOMETRIC MODELS OF U.S. NAVY CAREER PETTY OFFICER RETENTION

John Joseph Bepko, III
Lieutenant Commander, United States Navy
B.A., University of Connecticut, 1968

This thesis investigates the reenlistment behavior of U.S. Naval personnel who have completed more than two enlistment terms in the Navy. The Navy's 110 ratings are grouped into 24 occupational fields which represent clusters of similar skills, similar working conditions, and similar duty assignments. Multiple regression techniques are used to examine the relationship of economic variables to career reenlistment behavior.

The main conclusions of the study are:

- a. Economic variables such as military compensation, unemployment, and civilian wage opportunities are statistically significant predictors of career petty officer retention behavior.
- b. All-navy reenlistment rate can very accurately be predicted using a regression model with economic variables when the independent variables are within the range of values used to generate the regression model.
- c. Such regression models generally have very low predictive ability when derived from and applied to petty officers grouped into occupational fields.

Master of Science in
Management
June 1981

Advisor: G. W. Thomas
Department of
Administrative Sciences

ORGANIZATIONAL DESIGN CONSIDERATIONS FOR THE NEW COAST GUARD WMEC-270

Thomas Edward Bernard
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1970

The Coast Guard will receive the first of a new class of vessel, the 270 foot medium endurance cutter, beginning during the late summer of 1981.

Records show extensive planning to determine the optimum physical structure as well as the optimum mix and number of personnel.

The purpose of this study is to develop the optimum organizational structure which will support the interaction between the people and the physical characteristics of the vessel.

Three major factors were analyzed as part of this study. First, the operational requirements imposed on the vessel. Second, the environment which affects the vessel's ability to perform its operational requirements. Third, the availability of alternative design structures as determined from a review of the literature on structuring organizations.

Ultimately, a structural design is selected which best matches the organizational environment of the new Coast Guard WMEC-270 with its operational requirements in order to optimize the effectiveness of the new vessel.

Master of Science in
Management
June 1981

Advisor: C. K. Eoyang
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Administrative Science

HOW GOVERNMENTAL POLICIES REGARDING STRATEGIC AND CRITICAL
MATERIALS AFFECT THE ACQUISITION OF MAJOR WEAPON SYSTEMS

Terry L. Bollman
Lieutenant Commander, United States Navy
B.S., University of Illinois, 1970

The proliferation of uncoordinated governmental agencies and policies have had dramatic and stifling effects on U.S. strategic and critical materials industries and thus have contributed significantly to current problems of increased prices, lengthening leadtimes, and tenuous availability of these materials. These effects have a direct correlation to the same problems associated with the acquisition of major weapon systems. Government and private industry have been working to improve the situation, but much more needs to be done. A national strategic and critical materials policy must be adopted and implemented by a singly responsible agency; inventory goals of the National Defense Stockpile must be filled; and an investigation of an "economic stockpile" should be undertaken.

Master of Science in
Management
September 1981

Advisor: M. L. Sneiderman
Department of
Administrative Sciences

AN ANALYSIS OF THE USE OF MERCHANT SHIPS AND
CONTAINERIZATION IN AN AMPHIBIOUS OPERATION

Paul Joseph Bourdon
Major, United States Marine Corps
B.A., College of Sante Fe, 1967
M.ED., The American University, 1973

This study analyzes the use of merchant ships and containerization in an amphibious operation. Current sources, trends and problems, as they affect the merchant marine's ability to provide military logistical support to amphibious operations are evaluated. The functional capability of the various types of merchant ships to perform in an amphibious environment are analyzed. Modern concepts for solving the vehicle and container discharge problem from merchant ships are described and evaluated. The current Marine Corps Container System is analyzed for its compatibility with shipping assets and container handling/motor transport equipment. The study concluded that there are many problems when considering the use of merchant ships and containerization in an amphibious operation. These include the shortage of adequate shipping and the inability to efficiently handle containers in an amphibious environment. Among the several recommendations presented are: first, that military planners must establish the number and type of merchant ships required for large scale amphibious operations and work to ensure their availability; and second, that the development and purchase of containers and container offloading equipment for use in an amphibious objective area be expedited.

Master of Science in
Management
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Advisor: R. A. Bobulinski
Department of
Administrative Sciences

PERFORMANCE OF NAVY SERVICE MEMBERS ERRONEOUSLY ENLISTED
AS A RESULT OF THE MISNORMING OF ASVAB 6 & 7

John F. Boyer
Lieutenant Commander, Nurse Corps, United States Navy
B.S., Illinois State University, 1969
M.S., New York Medical College, 1973

In January 1976, the Armed Services Vocational Aptitude Battery (ASVAB) was adopted as the single DoD test to determine qualification for enlistment and eligibility for assignment to military occupations. Subsequent to the implementation of the ASVAB, analyses of the test's norming (i.e. conversion of raw scores to percentiles) were conducted which revealed a norming error. As a consequence, a potentially large number of individuals had been enlisted into the Armed Forces who would otherwise have been ineligible for military service had the test been correctly calibrated.

This study examines the performance of a sample of non-prior service males who, because of the misnorming of the ASVAB, were enlisted into the Navy. In terms of survival on active duty, completion of A-School, and attainment of pay-grade E4 or higher, those individuals who were erroneously enlisted did not perform as well as those who would have been eligible regardless of the norming error.

Master of Science in
Management
June 1981

Advisor: R. S. Elster
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Administrative Science

ADPE ACQUISITION: THE ACQUISITION OF THE NAVAL
POSTGRADUATE SCHOOL COMPUTER, A CASE STUDY

John Earl Boyle
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

The federal computer acquisition process is examined by studying one particular major computer system acquisition. The manner in which the principals involved conducted the acquisition in relation to the political and regulatory environment is examined and displayed in a case study format. Although the situational facts involve a computer acquisition for the Naval Postgraduate School, broad issues are developed which apply universally to public and private sector computer systems acquisition. The case exposes the reader to the issues of specification development, conversion costs, benchmark testing, and the role of competition in computer acquisition. Attention is focused on the environment in which a computer system need is developed and how that need is "marketed" through the review and support process of a large organizational buying system.

Master of Science in
Management
September 1981

Advisor: M. L. Sneiderman
Department of
Administrative Sciences

A PREDICTIVE STATISTICAL MODEL OF NAVY CAREER ENLISTED
RETENTION BEHAVIOR UTILIZING ECONOMIC VARIABLES

David Glenn Bradley
Lieutenant, United States Navy
B.A., University of Kentucky, 1974

This thesis was directed toward understanding the problem of Navy career enlisted retention. The thesis develops a statistical model to explain past Navy career retention rates, and to predict future career retention rates in the Navy. The statistical model utilizes economic variables as predictors. The model developed has a high correlation with Navy career retention rates. The problem of Navy career retention has not been adequately studied, and this thesis provides an initial examination of this area. The retention decisions are based upon economic variables. The findings indicate Navy policymakers must be cognizant of the relationships of economic factors to Navy career retention rates.

Master of Science in
Management
December 1980

Advisor: R. S. Elster
Department of
Administrative Sciences

BUDGET FORMULATION AT MARINE CORPS BASES AND STATIONS

Bruce Holden Brothers
Captain, United States Marine Corps
B.A., University of Oklahoma, 1972

This thesis studies the budget formulation procedures utilized by selected Marine Corps bases and stations. Their budgeting practices are examined for conformance with preferred budgeting practices for public organizations and with budgeting directives issued by Headquarters Marine Corps. The principal areas covered are the organization and training of budget personnel, the budget calendar, budget guidance, and budget formulation. The study binds important problems in areas including the adequacy of training and turnover rate of fund administrators, the quality of budget input submitted to budget officers, and the level of manager participation in the budget process. The study provides recommendations for improving the effectiveness and efficiency of budgeting in the Marine Corps based on the problem areas discovered.

Master of Science in
Management
June 1981

Advisor: R. A. Bobulinski
Department of
Administrative Sciences

STATISTICALLY DERIVED SYSTEM RELATIONSHIP MODELS FOR THE SASSY MANAGEMENT
UNIT, 1ST FORCE SERVICE SUPPORT COMPANY, CAMP PENDLETON, CALIFORNIA

John C. Cargill
Major, United States Marine Corps
B.G.S., University of New Hampshire, 1974
M.A., Pepperdine University, 1977
M.B.A., National University, 1979

This thesis develops thirty-one models defining various Supported Activity Supply System (SASSY) relationships as seen from the perspective of the SASSY Management Unit. Multiple linear regression combined with time series analysis is used on data drawn from the SASSY Management Unit at Camp Pendleton, California. Two years of data are used in developing the models which are then tested against five months of actual data to determine their abilities to describe and predict.

The utility of this thesis lies in its application at both local and higher organizational levels for funding and management decisions. The quantification of SASSY relationships is especially useful when auditing SASSY operations as deviations from historical patterns are immediately evident. The ability to predict future values with equations making use of time-lagged variables gives the using manager a greater flexibility in his operations, and will tend to bring the higher and lower organizational levels of management into a more common understanding of the problems faced by the SASSY Management Unit, thus providing greater structure to the decision making process.

Master of Science in
Management
June 1981

Advisor: LTCOL W. E. Skilrowski
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A STUDY OF PASSIVE SOLAR SPACE-HEATING TECHNIQUES
APPLIED TO FAMILY HOUSING UNITS WITHIN
THE CONTINENTAL UNITED STATES

William Frederic Carr, Jr.
Lieutenant, United States Navy
B.S., Northern Michigan University, 1974

Passive solar energy is presented as an alternative to conventional space heating for existing and future government family housing units. The extent of the current energy problem is presented together with the implications of the findings of the Workshop on Alternative Energy Strategies. These findings significantly influence the impending energy problems facing the Department of Defense. A technical analysis is made of five passive solar space-heating design alternatives in five climate zones within the continental United States to determine the potential savings in conventional heating fuel and dollars to the Department of Defense. In addition, major advantages and disadvantages of solar energy are presented. Recommendations for the utilization of passive solar energy in family housing units conclude the thesis.

Master of Science in
Management
March 1981

Advisor: R. Evered
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Administrative Sciences

CONGRESS' ATTEMPTS AT BUDGET REFORM: THE IMPACT OF THE
CONGRESSIONAL BUDGET OFFICE ON THE DEFENSE BUDGET PROGRESS

Steve Allen Castro
Captain, United States Army
B.B.A., University of Hawaii, 1971

This thesis assesses the impact of the Congressional Budget Office (CBO) on the defense policy-making process of the Congress. It provides historical background on the compelling influences underlying legislative budget reform and changes in the Congressional defense policy system that suggested a need for a CBO.

Specifically, it analyzes the manner in which the National Security and International Affairs Division within the CBO has contributed to Congressional defense policy-making. Particular emphasis is given to the effect which the CBO has had on the defense budget process itself, and assessment of the substantive value of its analyses and budget estimates with respect to their impact on defense policy outcomes.

Extensive review of available archival data and published reports is complemented by interviews of Congressional committee staff members who have had a direct experience or working relationship with the CBO regarding defense issues.

Major conclusions were that 1) CBO has made a measureable policy impact on specific defense issues, and 2) the degree to which this impact is observed varies among Congressional clients and is dependent upon the specific budget orientation and needs.

Master of Science in
Management
September 1981

Advisor: E. J. Laurance
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National Security Affairs

A COMPARISON OF THE ACQUISITION PROCESS FOR SHIP CONSTRUCTION PROJECTS
OF THE ROYAL AUSTRALIAN NAVY AND THE UNITED STATES NAVY

David P. Caton
Lieutenant Commander, Royal Australian Navy
B.Sc. (Eng L), Royal Navy Engineering College, 1970

This thesis compares the processes of acquisition for ship construction projects in the Royal Australian Navy and the United States Navy. It examines the problems associated with government furnished equipment with regard to specifications, timing, quality assurance, and cost. The requirements of standardization, commonality, and interoperability with allied nations is also discussed.

The differences are not many, and can be attributed to the demographic aspects of each country, and the fact there is always more than one way of operating. The process theoretically should flow smoothly from one phase to the next, however, differences between authorities on minor aspects can lead to delays in the total project.

A proposal for a replacement shipbuilding programme for the Royal Australian Navy is presented, whereby the fleet would be continually updated with new ships and new weapon systems on a cyclical basis. This proposal would increase involvement by Australian industries in warships for Australia. It would also solve many of the current problems with government furnished equipment, and provide a substantial degree of standardization.

Master of Science in
Management
June 1981

Advisor: W. H. Cullin
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Administrative Science

MILITARY SERVICE AS A DETERMINANT OF POST-SERVICE EARNINGS

Stephen Garnet Chamarette
Major, Royal Australian Army Ordnance Corps
B.Ec., University of Western Australia, 1974

The relationship between military service and post-service earnings was analyzed using the 1976 data of the National Longitudinal Survey of Young Men (14 to 24 years of age in 1966). The sample was broken down by race and veteran status. When earning attributes were examined it was found black veterans on average were socio-economically better off than black non-veterans, while the reverse was true for whites. This era, which included draftees, selectees, and volunteers, failed to produce a military which was representative of society. The post-service earnings analysis indicates that the effect of military service on subsequent civilian income was negative. This was particularly true for those veterans who failed to use the military's in-service or post-service opportunities to further their general level of education or undertake vocational training. In sum, a term in the military has a more positive earnings effect than civilian unemployment, but a more negative earnings effect than civilian employment.

A major recommendation is that programs withdrawing members from the civilian sector for extended periods need to compensate adequately those members either during or after service.

Master of Science in
Management
June 1981

Advisor: G. Thomas
Department of
Administrative Sciences

IMPLICATIONS OF THE CIVIL SERVICE REFORM ACT OF 1978
ON PERFORMANCE EVALUATION IN NAVY FIELD LEVEL
ACTIVITY COMPTROLLER DEPARTMENTS

Jan Marie Clausen
Lieutenant, United States Navy
B.S., University of Florida, 1975

This thesis examines the impact of the Civil Service Reform Act (CSRA) of 1978 on performance evaluation at the field activity level. Reviews of both the CSRA and various methods of performance appraisal are conducted in order to analyze performance evaluation characteristics relative to the requirements of the CSRA for performance appraisal. The results of this analysis were then compared to specific positions within Naval activity comptroller departments to demonstrate how the basis for a standardized framework for evaluations can be developed for Navy-wide applications. Sets of potential critical elements for three specific positions were derived based on this framework and an example of performance standards for a specific critical element were shown. In conclusion, this thesis makes several recommendations for ensuring that the intent of the CSRA requirement for flexibility of performance evaluations is maintained while allowing guidance and standardization from higher authority.

Master of Science in
Management
March 1981

Advisor: R. A. Bobulinski
Department of
Administrative Sciences

AN APPLICATION OF LIVING SYSTEMS THEORY
TO COMBAT MODELS

Raymond R. Crawford, Jr.
Captain, United States Army
B.S., United States Military Academy, 1972

This thesis proposes a framework for incorporating organizational aspects in combat models. It begins by explaining Dr. James G. Miller's Living Systems Theory (LST) as a possible framework. Included in this discussion is a review of the basic nature and potential of LST. A review of the Army's involvement with LST and its present status is discussed. Recommendations are made for supplemental research which may help to develop this framework for the Army. A review explains present combat model limitations for describing organizational phenomena in combat. Finally, a methodology is proposed to integrate the results of LST into combat models of the future. Included as an Appendix is a discussion of General Systems Theory which will help to explain the basis for LST.

Master of Science in
Management
March 1981

Advisor: S. H. Parry
Department of
Operations Research

FATHER ABSENCE EFFECTS ON MILITARY CHILDREN

Donald Joseph Curran, Jr.
Lieutenant Commander, United States Navy
B.A., University of Wisconsin, 1970

The effects of father absence on military children were studied by use of a questionnaire and personal interviews. The sample consisted of U.S. military officers and their dependents stationed at the Naval Postgraduate School, Monterey, CA. The study focused on the nature of the absence and how that affected the children's emotional stability and child development. In addition, some coping mechanisms were studied to determine if these aided in coping with separation.

The study concluded that no significant relationship between emotional problems or child development and father absence existed for those in the sample. The coping mechanisms used in the study were found to be of great value in aiding the children and families to deal with separation.

Master of Science in
Management
March 1981

Advisor: P. N. Butler
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Administrative Sciences

THE FEASIBILITY AND COST-EFFECTIVENESS OF UTILIZING
SKILLED PAROLEES IN THE UNITED STATES ARMED FORCES

DeQuincey Adam Davis
Captain, United States Marine Corps
B.S., North Carolina A&T State University, 1972

The continued high percentages of skilled personnel in the United States (U.S.) Armed Forces that are currently leaving the service has become not merely a personnel problem for the military, but for the U.S. as well. Much controversy surrounds the social and economic foundations with which the political and military establishment must deal. This thesis presents a methodology for analyzing the possible utilization of selective parolees from various institutions into the U.S. Armed Forces. The proposal in this thesis, it is believed, could possibly drastically reduce current manpower shortfalls in the military institutions. The jobless parolee is a drain on the tax-structure both locally, and nationally. An employed parolee would stop this drain by producing taxable income. Finally, the severe problem of a revolving door-type-recidivism which has defied solutions could possibly be partially solved by this approach. The author admits that this approach is unusual, yet, it is probably a valid assertion that unusual problems require creative and sometimes unusual solutions.

Master of Science in
Management
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Advisor: R. A. Bobulinski
Department of
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BUDGET EXECUTION (O&M,N) AT NAVY SHORE ACTIVITIES

William Joseph Donnelly
Lieutenant Commander, United States Naval Reserve
B.S., Miami University, 1968

This thesis addresses the budget execution function at Navy shore commands in regard to the expenditure of Operations and Maintenance, Navy (O&M,N) appropriated funds. The paper discusses the basics of management control and links the budget execution function thereto. The discussion of management control includes an explanation of the Management by Objectives and Results (MOR) model. The thesis also discusses current budget execution practices and procedures as well as the financial environment within which shore activities operate. Results of a budget execution questionnaire which was completed by the comptrollers of 49 Navy shore commands are presented and analyzed in terms of the conceptual foundations of management control addressed within this paper. A number of system shortfalls are discussed including the significant absence of a meaningful crosswalk between financial and performance results in management reporting systems and the lack of a formalized resources management training emphasis at shore commands. Finally, appropriate recommendations for system improvements and further research are made.

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Advisor: R. A. Bobulinski
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AN ORGANIZATION DEVELOPMENT APPROACH TO THE TECHNOLOGY
TRANSFER IN THE NATIONAL FOREST SERVICE

Edward Paul Dulude
Lieutenant Commander, Medical Service Corps, United States Navy
B.S., George Washington University, 1976

and

Michael Martin Loessin
Lieutenant Commander, United States Navy
B.A., University of Texas, 1970

Technology transfer efforts conducted by the National Forest Service since 1972 provide the base for this work. Problem areas, as identified by the Forest Service, include an inability to acceptably institutionalize technology transfer processes throughout its system and a concomitant hesitancy for technology transfer processing to become an integral part of daily operations.

The problems are examined, using an organization development approach, by applying a model which breaks down the Forest Service organization into several major subcomponents. The subcomponents comprising the model are: People, Structure, Technology, Communications, Tasks and Goals, and Environment. An analysis is then conducted to determine the measure of "fit" among the various subcomponents in terms of their contributions to or hindrance of the technology transfer effort.

The conclusion identifies perceived weaknesses in the subcomponents of Structure and Communications, and a recommendation is proposed identifying a method of establishing a more viable communication/responsibility network through which technology transfer processes may flow.

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IDENTIFICATION OF CAUSES AND ANALYSIS OF TECHNIQUES
FOR REDUCING DELINQUENT DELIVERIES IN DEPARTMENT OF
DEFENSE PRODUCTION CONTRACTS

Glen Berry Dunbar, III
Captain, Signal Corps, United States Army
B.S., Business Administration, University of Illinois, 1971

Approximately one in four Department of Defense production contracts are being carried in a delinquent status. These late deliveries have a value of several billion dollars, and eighty percent of the delinquent contracts are over ninety days late. The impact of these late deliveries effects many military organizations in a variety of ways. The causes of delinquency stem from actions of the Government and of the contractor. The Government attempts to use a number of incentives to motivate the contractor to provide timely delivery of the required items. It also utilizes a variety of procedures in an attempt to control and reduce the *number of delinquent contracts*. Yet a significant portion of the contracts are delinquent.

The objective of this research effort was to provide a survey study of the delinquency problem, with a particular view of stimulating further in-depth research into its various aspects.

Master of Science in
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IMPROVING JUMPS/MMS RESPONSE TIME FOR THE U.S. MARINE CORPS

Paul S. Edwards
Captain, United States Marine Corps
B.S.I.M., Purdue University, 1974

The JUMPS/MMS system was implemented by the Marine Corps in 1973. The performance of JUMPS/MMS is considered unsatisfactory because the time delays in entering information into the system result in computed amounts that do not reflect the individual Marine's current entitlements. Since the Marine Corps considers payment of all entitlements to date as important to morale, the use of the current JUMPS/MMS system necessitates the parallel operation of the old manual system. This thesis explores the use of On-Line Real-Time systems. The study concludes that an OLRT system would serve to reduce time delays, and that ADPE-FMF equipment could serve as the vehicle for implementing an OLRT system.

Master of Science in
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AN ANALYSIS OF MATERIAL DISTRIBUTION FROM NSC SAN DIEGO TO LOCAL CUSTOMERS

Jeffrey M. Eller
Lieutenant Commander, Supply Corps, United States Navy
B.L.A., Lamar University, 1971

and

Robert T. Moore, III
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of Washington, 1971

On 1 October 1980 the wholesale support function of the Naval Air Station North Island (NASNI) was consolidated with that of the Naval Supply Center, San Diego (NSCSD) according to the DOD Material Distribution Study and the Shore Establishment Realignment Program (SER V). If the consolidation is to be judged as a success, NSCSD must offer improved post-consolidation support to its local customers, especially the Naval Air Rework Facility (NARF) at NASNI. This thesis offers a general discussion and documentation of the pre-SER NSCSD local delivery system in order to form a baseline from which to measure future system performance and effectiveness. It specifically addresses NSCSD's local delivery organization, facilities, and resources, plus the identification of the local customer base and the volume of business they generate.

Master of Science in
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EFFECTS OF THE U.S. NAVY BILLET ASSIGNMENT PROCESS
ON LINE OFFICERS' CAREER INTENTIONS

Joseph Orlando Estabrooks
Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1970

This research analyzes the responses of 926 Naval Officers to the 1980 Unrestricted Line Officer Feedback Survey in the context of military and civilian career theory. Results indicate that the large majority of officers do not change their career intent as a result of a particular re-assignment and the detailing process associated with it. Of those who do make changes in the career intention, approximately one-half are favorable and one-half are unfavorable with respect to continuation in the service. Of those who do not make career intent changes, quite a few (23 percent) are in unfavorable retention categories. Accordingly, detailing has the potential for positively influencing retention decisions at any change of assignment. Results show that detailing should be sensitive to personal desires of the individual, and his/her perceived involvement in the detailed decision. Career intention changes seem to be differentially related to the direction of movement between sea and shore, and to the officer's warfare community.

Master of Science in
Management
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THE DEVELOPMENT OF MANAGEMENT POLICY
IN THE DEPARTMENT OF DEFENSE

Rex A. Estilow
Captain, United States Marine Corps
B.S., United States Naval Academy, 1975

This study traces the development of management policy within the Department of Defense (DoD) from the 1947 National Security Act to present. It presents the recommendations of the major studies and the provisions of the major legislative initiatives of this period, which affected DoD management policy. The effects of this evolving management policy upon various major, functional, management problems are then assessed. Finally, this study summarizes the progress made in the development of management policy by four major DoD organizations: the Office of the Secretary of Defense, the Joint Chiefs of Staff, the individual military departments, and the offices of the Commanders in Chief (CINCS) of the unified and specified command structure.

Master of Science in
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SWOTOURS: A MODIFICATION OF AN INTERACTIVE COMPUTER MODEL
TO ANALYSE THE MANPOWER REQUIREMENTS OF THE OPERATIONAL
TOURS OF U.S. NAVY SURFACE WARFARE OFFICERS

William Daniel Ferree
Lieutenant Commander, United States Navy
A.B., Grove City College, 1970

This thesis presents a modification of an interactive computer model designed to examine the Surface Warfare Community. The model called SWOTOURS is designed to provide information that allows manpower managers increased analytical power. A tour structure is defined, and specific billet requirements for each tour are assumed. Billet requirements and officer supplies are compared to calculate tour opportunities or shortfalls. Officer inventory computation was specifically changed so that the model now ages its own inventories. Also, a new computational method to compute tour opportunities was introduced so that the model's calculations would simulate those of the Navy's manpower managers who would make use of the model. Model capability is demonstrated by alterations made to current data to show their effects on operational tour opportunity. A major portion of the changes deal with the officer manpower problems implied by the proposed policy of increasing fleet size towards 600 deployable ships by the end of the decade. The model shows the impact of such a ship growth on opportunity rates. Other changes are demonstrated to show how some manpower policy variables can be changed to alleviate the effects of growth in ship inventory.

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AN ANALYSIS OF THE EVOLUTION OF GOVERNMENT PATENT
POLICY IN RESEARCH AND DEVELOPMENT CONTRACTS

Patrick James Flanagan
Lieutenant, Supply Corps, United States Navy
B.S., University of Scranton, 1972

This thesis presents the historical development of Government patent policy with respect to the rights to invention arising from Federally-funded research and development contracts. Following World War II, the steadily increasing Government investment in R & D activities focused national attention on the controversial issue of patent rights. Several decades of debate notwithstanding, no uniform Government patent policy exists today. The 1980 amendments to the U.S. patent and trademark laws represent a compromise between the advocates of the "title" and "license" schools of thought. The interaction of the Executive, Legislative, and Judicial Branches in attempting to establish a uniform Government patent policy applicable to all Federal agencies and departments has been unsuccessful. This situation provides the impetus for future legislative efforts in this area. This thesis provides recommendations for evaluating the impact of the 1980 amendments and insuring that the agency patent policy provisions are promptly implemented.

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AN APPLICATION OF A MANAGEMENT
PERFORMANCE AUDIT PROGRAM

Stephen P. Folan
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B.S., Indiana University, 1975

As part of the Navy Postgraduate School's community service program, this study was conducted to determine the effectiveness and efficiency of the management of the Monterey Peninsula Transit system, Monterey, California. Initially, a brief history of public transportation in the United States is provided. The criteria for this performance evaluation was a model developed by the Institute for Urban Transportation, Indiana University. Embellished with additional material provided through the author's research, the model provided a perspective for each of the functional areas, such as marketing, maintenance and personnel, within the transit system.

Data on the Monterey Peninsula Transit system was gathered from interviews with agency employees, examination of documents, and actual observation of system operations. Deviations between agency operations and the model's tenets or preferred practices became areas for additional research and, if deemed appropriate, recommendations were made in an attempt to enhance operations and improve effectiveness. A significant conclusion is that the performance audit is of value toward the improvement of public transportation system management.

Master of Science in
Management
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Advisor: R. A. Bobulinski
Department of
Administrative Science

SOCIALIZATION OF BLACK NAVAL OFFICERS
BLACK OFFICERS EXPERIENCE A MORE TRAUMATIC SOCIALIZATION PROCESS UPON
ENTERING THE NAVY THAN DO THEIR WHITE PEERS DUE TO CERTAIN DIFFERENCES
BETWEEN THE BROADER BLACK AND WHITE SUB-CULTURAL SOCIALIZATION PROCESS

Jerry Wilson Ford
Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1969

This study was undertaken to assess the impact of the organizational socialization process as it pertains to the Black male Navy officers. The intent is to examine whether that process unduly traumatizes these minority officers and to determine if there are factors in the process which might impact negatively upon the recruitment, employment and retention of Blacks and other minorities into the officer ranks.

Through the use of interviews, archival data, and some necessary subjective evaluations, the impact of the socialization phenomenon was analyzed using the three stages model of socialization: anticipatory stage, entry stage, and adaption stage. This model is based upon that formulated by Dr. M. Louis.

The results of this study suggest that barriers exist to the full adaption or acculturation of Blacks into the officer corps and that these barriers are mostly hidden from both Blacks and Whites. These barriers, it is noted, have little to do with malice but rather are erected and perpetuated through a lack of cultural awareness and literacy on the part of both groups. This study further concludes that Blacks have predominantly White officer corps but may have formed a subgroup of differently acculturated officers. This latter premise would suggest that the positive utilization of Black officers leaves much to be desired.

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Advisor: R. A. McGonigal
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Administrative Sciences

The implication of these findings around the issues of women and other minorities entering the officer ranks along with recommendations for reducing these barriers to adequate socialization are included in the conclusion of this study.

THE SPONSOR PROGRAM: FACILITATING ANTICIPATORY SOCIALIZATION FOR
PERSONNEL BEING TRANSFERRED IN THE UNITED STATES COAST GUARD

Steven Edward Froehlich
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

This thesis examines one way in which the U. S. Coast Guard can help facilitate the transition of personnel being transferred on PCS moves. Specifically, it focuses on the Sponsor Program and the anticipatory socialization of the member being transferred. A description of each of the other military services' Sponsor/Indoctrination Programs is included, as well as some of the relocation programs used in the civilian community. The results from a survey of a sample of Coast Guard units provide information on the reactions and feelings of Coast Guard personnel towards the Sponsor Program, and provide empirical support for theoretical propositions about links between the Sponsor Program, transition smoothness and job satisfaction. In the concluding chapter, the author makes recommendations for how the Coast Guard can improve the Sponsor Program and potentially increase both job satisfaction and retention of personnel in the Coast Guard.

Master of Science in
Management
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Advisor: M. R. Louis
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Administrative Science

THE RELATIONSHIP OF INITIAL ASSIGNMENT AND PERSONAL BACKGROUND
VARIABLES TO FIRST TERM ENLISTED ATTRITION FROM THE NAVY

Daniel E. Gardner
Lieutenant Commander, United States Navy
B.S., Baldwin Wallace College, 1969

This thesis was conducted to compare the characteristics and attrition rates of first term enlisted personnel initially assigned to ships with those assigned to non-ship duty stations. Identification of traditional and non-traditional variables with emphasis on ship characteristics were evaluated as predictors of first term attrition rates.

A cohort of non-prior service male recruits was tracked over their first 33 to 36 months in the Navy. The attrition rates for ship and non-ship duty personnel were compared using regression analysis techniques. Overall, the cohort initially assigned to ships had significantly lower attrition rates than those assigned to non-ship duty. Submarines experienced an attrition rate approximately *one-half that of other ship types*. The relatively low attrition rates from submarines may be due to high screening criteria and to the fact that sailors found to be inadequate performers are often transferred to the surface fleet. Observation of the mental group mix assigned to ships was not representative of the mental group mix of the entering cohort. The data showed underrepresentation of upper mental group and A-school trained personnel assigned to ship duty. This finding warrants further investigation.

Ships unique variables (e.g., ship type, engineering plant, home-port) did not appear to have a significant relationship with attrition. The analysis of these variables should aid Navy Managers in understanding the Navy's first term attrition problem.

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Advisor: R. S. Elster
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Administrative Sciences

ARCTIC ALASKA AND ICEBREAKING: AN ASSESSMENT
OF FUTURE REQUIREMENTS FOR THE
UNITED STATES COAST GUARD

Jeffrey M. Garrett
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

Technological advances, increased energy demand, and political events have coalesced in recent years to make the extraction of hydrocarbon energy resources in the arctic attractive. U.S. efforts in this direction have begun on Alaska's North Slope and are poised to expand into offshore areas. These developments could have, particularly in conjunction with marine transportation, a dramatic impact on the U.S. Coast Guard and especially its icebreaking mission.

Evaluation of this impact is approached by a background review of the Coast Guard's icebreaking role and historical development in Alaska; and by evaluation of five issues which seem to be primary determinants of the relevant future. These include (1) energy development; (2) energy-related transportation; (3) concerns for the natural and social environment; (4) Canadian arctic developments; and (5) the international perspective. Trends in these five issue areas are then integrated to formulate a projection of future Coast Guard icebreaking requirements in the Alaskan Arctic.

Master of Science in
Management
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A FIRST-TERM ATTRITION SEVERITY INDEX FOR U. S. NAVY RATINGS

Patricia Griffin
Lieutenant Commander, United States Navy
B.S., University of Tennessee, 1972

The purpose of this thesis was the development of a first-term attrition severity index for 85 United States Navy enlisted ratings. The multiattribute model utilized in the development of the index was constructed using five rating-specific factors: 1) attrition, 2) replacement costs, 3) size (number of personnel in the rating), 4) shortage or excess of billet requirements, and 5) priority. The model provided first-term attrition severity indicators for the 85 ratings included in the study, indicating the diverse impact of attrition across Navy ratings and provide a practical basis for assigning scarce manpower resources to enlisted ratings experiencing the most severe effects of first-term attrition.

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Advisor: G. W. Thomas
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THE IMPACT OF TECHNOLOGICAL CHANGE IN ELECTRONIC REPAIRABLES
ON THE ACQUISITION PROCESS AT NAVY SHIPS
PARTS CONTROL CENTER MECHANICSBURG

Roy Allison Hallums, Jr.
Lieutenant, Supply Corps, United States Navy
B.B.A., Memphis State University, 1971

This thesis provides details concerning the current Navy Ships Parts Control Center Mechanicsburg (SPCC) and Naval Electronic Systems Command (NAVELEX) interface related to procurement of 4G cognizance (COG) electronic repairable items. The process involved and the problems which arise in this interface are examined beginning with the triggering process based on the continued monitoring of stock levels at SPCC that initiates the acquisition process, through SPCC's contracting procedures, to the technical procurement data inputs provided by NAVEL-EX. Technical data transfer, technological change, and military specifications appear to be the major causes of problems in the SPCC/NAVELEX interface. Several alternatives, such as a Technical Support Agreement, are offered as possible solutions to the problems discussed.

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Administrative Sciences

MULTI-YEAR REVENUE AND EXPENDITURE FORECASTING
FOR SMALL MUNICIPAL GOVERNMENTS

Stanley Eugene Hankins
Lieutenant Commander, Supply Corps, United States Navy
B.S., Southwest Missouri State University, 1969

and

Thomas Philip Bechard
Lieutenant Commander, Civil Engineer Corps, United States Navy
B.S., Merrimack College, North Andover, Massachusetts, 1966

This thesis explores multi-year revenue and expenditure forecasting as a financial management tool available to small municipal governments. A generalized approach for developing a multi-year forecasting process is presented, together with a multi-year revenue and expenditure forecasting model for the City of Monterey, California. The Monterey model includes an econometric approach for projecting revenues, while the expenditure forecast is based on a deterministic approach. Suggestions for forecast presentation, an approach to model updating, and a discussion of the interrelationship between the budget formulation and forecasting processes is also presented.

Master of Science in
Management
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Advisor: R. A. Bobulinski
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DUAL CAREER FAMILIES WITHIN THE COAST GUARD OFFICER CORPS

Harland Henderson
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B.S., U.S. Coast Guard Academy, 1975

Dual career couples are studied and compared with single and dual income families within the Coast Guard officer corps. The purpose of the thesis is to determine the percent of officers in each category and then examine differences among the three lifestyles.

It was found that 24.2 percent of the respondents had dual career families compared to 21.1 percent of dual income and 54.7 percent for single income. Significant differences among the three lifestyles were found in the total and planned number of children, the appropriate age of children for the spouse to resume employment, spouse's level of education and how they felt about detailers considering the spouse's employment when determining assignments. Transfers were the biggest problem that dual career families had to cope with. It is concluded that the Coast Guard is doing a good job of managing its personnel based on the high degree of career satisfaction and the number of people who plan on a full 20 year career.

Master of Science in
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Advisor: R. McGonigal
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A STUDY OF FINANCIAL MANAGEMENT TRAINING OF COAST
GUARD JUNIOR OFFICERS IN COMMAND AFLOAT AND ASHORE

Douglass Scott Hertz
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B.S., United States Coast Guard Academy, 1973

This thesis contains the results of a financial management survey of Coast Guard Junior Officers in command positions. The thesis examines the financial management training and performance of Coast Guard Junior Officers. The results of the financial management survey are used to support the conclusions and recommendations regarding the financial management training needs of Coast Guard Junior Officers.

As part of the thesis recommendations, the author develops a Financial Management Guidebook for Junior Officers in Command Positions. The guidebook is developed in cooperation with the Department of Management/Economics at the Coast Guard Academy to improve the financial management training of Cadets. The objective of the guidebook is to better prepare Junior Officers to assume their financial management responsibilities associated with their command positions.

Master of Science in
Management
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Administrative Sciences

WHY MID-GRADE SURFACE WARFARE OFFICERS
ARE RESIGNING FROM THE NAVAL SERVICE

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B.S., Cameron College, 1974

This thesis addresses the reasons for mid-grade (O-2 to O-4) Surface Warfare officer resignations. It makes recommendations that would possibly increase retention for the mid-grade Surface Warfare Officer community. Statistical analyses were performed upon data from post-resignation questionnaires. A list of the ten most reported reasons for resigning was then compiled. A series of recommendations which might have a positive effect upon retention were then derived.

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Advisor: R. S. Elster
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PRE-CONSOLIDATION SUPPLY SUPPORT FOR NARF
ALAMEDA AND NSC OAKLAND LOCAL CUSTOMERS

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B.S., United States Naval Academy, 1969

and

Wayne Allen Owen
Lieutenant Commander, Supply Corps, United States Navy
B.S., Virginia Polytechnic Institute,
and State University at Blacksburg, 1971

and

Ronald Gordon Popp
Lieutenant, Supply Corps, United States Navy
B.S., Kansas State University at Fort Hayes, 1971

On October 1, 1979 the wholesale support functions of NAS Alameda were merged into NSC Oakland according to the recommendation of a Department of Defense Material Distribution Study (DODMDS). The study suggested that the optimal consolidation of collocated wholesale activities would result in improved customer response at reduced costs. If the merger is to be accredited as a success, NSC Oakland must offer improved post-consolidation support to its local customers and NARF Alameda. This thesis presents a baseline of pre-consolidation data which provides a measure of the supply support provided by NSC Oakland to its local customers and by NAS Alameda to NARF Alameda. This baseline should facilitate both implementation and evaluation of the consolidation's success.

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REAWAKENING RESISTANCE TO DRAFT REGISTRATION:
SOME IMPLICATIONS FOR THE 1980'S

Paul Joseph Jackson
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B.A., Marquette University, 1974

On July 21, 1980, after a five year suspension, draft registration returned to the United States amid scattered protests. Men born in 1960 were to register the first of a two week registration period, filling out cards with their names, addresses, Social Security numbers and other information at local post offices. Those men born in 1961 were required to register the following week. Men born in 1962 will be required to register the week beginning January 5, 1981. After that, men will register as they turn 18 years old.

During the initial two week draft registration period, individuals and organizations opposed to registration held rallies, leafletted and picketed the nation's post offices, conducted counseling sessions for registration-age males, and sponsored meetings to discuss and answer questions about registration and alternatives to registration.

The focus of this thesis is the reawakening resistance to President Carter's registration plans as demonstrated by meetings on registration and alternatives to registration sponsored by anti-registration groups, as well as by anti-draft literature published by national anti-draft organizations.

The objectives of this research are: (1) to determine who the leaders of the local draft registration meetings are; (2) to determine the extent of their support at these meetings; (3) to gather data on the alternative to draft registration offered at these meetings as well as in current anti-draft literature; (4) to gather data on the effectiveness of such meetings in convincing draft-age youth not to register or to register under protest; (5) to offer predictions, based on the history of draft resistance in America and on the observations made above, on the impact of such groups on future attempts to bring back the draft.

Master of Science in
Management
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TEST AND EVALUATION AND GRADUATE EDUCATION NEEDS

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Naval Air Test Center
Naval Air Station Patuxent River, Maryland
B.S., West Virginia University, 1960
M.S., West Virginia University, 1962

The hypothesis is advanced that testing and evaluation (T&E) of complex weapons systems requires unique skills that the testing and evaluation of weapons systems has evolved into a recognizable engineering discipline, and that professional technical personnel in the Department of Defense Test and Evaluation community should be considered as unique assets and supported by the establishment of a postgraduate curriculum in T&E engineering.

The evolution of DOD T&E is traced and analyzed with particular attention to capability requirements of personnel.

The general conclusion is reached that the hypothesis can not be universally supported. Reasons for this position are given and recommendations made for improving capabilities of T&E personnel.

Master of Science in
Management
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COMPUTERIZED ADAPTIVE TESTING: A CASE STUDY

Robert Samuel Kayler
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B.B.A., George Washington University, 1966

This thesis is a case study of mental testing in the military as it applies to mental qualifications for service. The thesis begins with a review of the literature concerning the history of mental testing, particularly in the military services, through the current Armed Services Vocational Aptitude Battery (ASVAB) forms -8, -9, and -10. Then, a discussion of issues facing mental testing in general is presented, followed by a report of research into Computerized Adaptive Testing (CAT) currently conducted at the Navy Personnel Research and Development Center, San Diego. Finally, a concluding chapter discusses some considerations involved in the implementation of CAT.

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Management
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ANALYSIS OF THE EFFECTIVENESS OF RTC CREDO
TO COUNTER FIRST-TERM ENLISTED ATTRITION

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B.A., Villanova University, 1969

A statistical analysis was conducted to assess the effectiveness of the experimental program, RTC CREDO, to counter first-term enlisted attrition in the Navy.

The results of this study demonstrate that the RTC CREDO experiment was successful in reducing first-term enlisted attrition by 1.22 percent after 14 months of service when compared to a control group.

This difference was not statistically significant at the .05 level. The reduction in attrition gained by the RTC CREDO experiment appears at this time to be inefficient with respect to the cost of the program. It is recommended that the RTC CREDO program in its present form and with its present contribution toward reducing first-term attrition be discontinued, unless the difference between control group and CREDO attrition rates increases markedly by the time the cohort finish their first enlistment periods.

Master of Science in
Management
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FOREIGN MILITARY SALES: O&MN APPROPRIATIONS
ARE SUBSIDIZING ACCESSORIAL COSTS

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B.S., University of Colorado, 1973

The rapid expansion of the Foreign Military Sales (FMS) program during the 1970's dramatized the need for adequate measures to recoup the costs of sales of defense stocked material. In implementing FMS cases the U.S. Navy utilizes the same resources and support organizations that are employed to manage and implement U.S. Navy support programs. To reimburse the O&MN appropriated funds used to finance the FMS transactions, a universal language must be utilized to transmit expenditure information to the billing, collecting and accounting activity, the Security Assistance Accounting Center (SAAC). Accuracy of the information is critical for the full recoupment of expenditures. The thesis addresses the problems associated with the accuracy of expenditure information for the recoupment of packing, crating, handling and transportation costs incurred by U.S. Navy activities. To improve the accuracy of expenditure information, recommendations are made for the Navy to utilize the previously established transportation billing code (TBC).

Master of Science in
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A HISTORICAL ANALYSIS OF INTERNAL REVIEW

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Internal review is the local commander's in-house audit function; and as such forms an important part of the local commander's system of management controls. Recently, increased emphasis has been placed on internal review because of the increased awareness of the need to manage accountable resources and the internal review function's potential for improving the economy, efficiency and effectiveness of operations. This thesis examines the history and development of auditing in general and internal review in particular, presents the current status of internal review in the Department of Defense and analyzes the effectiveness of current programs. Five alternatives of internal review organization are analyzed for effectiveness and a decentralized but hierarchical organization proposed for implementation. Other recommendations include organizing the internal review function in a direct staff relationship to the local commander and the placement of local audit boards under the direct supervision and management of the internal review function.

Master of Science in
Management
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Advisor: R. A. Bobulinski
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COMBINED ARMS TRAINING PROGRAM COST ANALYSIS

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B.S., University of Southern Mississippi, 1971

and

Billy J. Clarkson
Captain, United States Marine Corps
B.B.A., University of Oklahoma, 1974

The Marine Corps Air Ground Combat Center is tasked with the mission of developing, administering, and evaluating the Marine Corps Combined Arms Training Program. The allocation of increasingly scarce resources mandates that this training program be conducted as efficiently as possible.

The purpose of this thesis is three fold. First it examines the problems with the present budgeting system, cost accounting and reporting procedures, and the methods of establishing levels of resources to be used in combined arms training exercises employed by the Marine Corps Air Ground Combat Center. Second, it presents a model for accurately estimating the cost of these exercises through the establishment of standard costs. Third, it presents an alternative budgeting and cost reporting system and makes specific recommendations to improve the efficiency of the Combined Arms Training Program.

Master of Science in
Management
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AN OVERVIEW OF INTEGRATED LOGISTIC SUPPORT
IN MEDICAL MATERIAL PROGRAMS

Robert Paul Legg
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This thesis addresses the application of integrated logistic support (ILS) principles to Navy medical material programs, describes some of the factors affecting cost and organizational relationships, presents a survey of audit reports and interviews with medical material managers, and makes recommendations for improving the management and maintenance support of medical material and equipment. Conclusions indicate that ILS is both highly essential and viable. The author contends that the employment of matrix project techniques, an adequate management information system, and an administrative support organization coupled with the ILS system advocated by the Department of Defense (DOD) and Department of the Navy (DON) will improve the management and maintenance support of medical material and equipment programs.

Master of Science in
Management
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THE SUPPLY OF NROTC MIDSHIPMEN

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The effects of a declining population of entering college freshmen and the Navy's requirements for technical majors and high Scholastic Aptitude Test (SAT) scores on the supply of Naval Reserve Officer Training Corps Midshipmen were examined using the NROTC Class of 1981. It was found that as the population of college-age youth declines, it is not likely that the Navy will be able to recruit sufficient applicants of the quality currently desired. The attrition rate appears to be the same for technical and nontechnical majors, but it is possible to discriminate between freshman and sophomore year attritees on the basis of individual characteristics. Students with SAT composite scores between 1150 and 1199 were found to show the highest propensity to survive to the junior year. Colleges with NROTC programs had reliably predictable differences in student attrition rates using NROTC Classes of 1981 and 1982.

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AN ANALYSIS OF DOD'S STANDARDS OF CONDUCT APPLICABLE
TO PERSONNEL ASSIGNED TO THE CONTRACTING ARENA

Paul S. Maruszak
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The standards of conduct, DOD Directive 5500.7, establishes the basic guidelines for ethical behavior for all Department of Defense (DOD) personnel. Based on the author's review of literature and interviews conducted with Federal law enforcement agencies, the standards are adequately doing their job, prescribing the required standards of ethical conduct. As a means to continue to accomplish this task and enhance its role, a "Study Guide of Ethics and Standards of Conduct" has been developed for use by procurement personnel. The study guide amplifies the major areas of the standards through the use of lectures, group discussions and relevant case examples. Its purpose is to keep the standards fresh in the minds of procurement personnel and relevant to the ethical challenges they may encounter.

Master of Science in
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IMPLEMENTATION OF THE SERVICE CONTRACT ACT OF 1965

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The major issues concerning the implementation of the Service Contract Act of 1965 are addressed. Current implementation problems experienced by procurement agencies are identified. The intent of the law, the Department of Labor's administration of the law, and procuring agencies' actual implementations are coupled with DOD DAC 76-20 on coverage and implementation of the Service Contract Act to develop a service contract procedure manual. This manual might also be used as a training guide.

Master of Science in
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DETERMINING THE TRAINING EFFECTIVENESS AND COST-EFFECTIVENESS
OF VISUAL FLIGHT SIMULATORS FOR MILITARY AIRCRAFT

George Benjamin Mayer, Jr.
Major, United States Marine Corps
B.S., University of Florida, 1976

The constraint on oil flow from the Middle East as a result of the 1973 war and the increased sophistication of aircraft weapon systems are two important factors which have contributed significantly to the interest in visual flight simulation as an integral part of military flight training. Costs associated with these factors, such as procurement and fuel costs, are providing pressure to the military establishment to improve their capability to provide military pilots with visual flight simulation systems which do not impair combat effectiveness or aviation safety. This thesis describes the results of flight simulation utilization by the commercial airline industry, analyzes the effectiveness realized by using flight simulators to supplement military training in different aviation environments, and outlines methodologies for measuring and improving the cost-effectiveness of the systems. Recommendations for careful study are made in areas that would improve military utilization of flight simulation.

Master of Science in
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AN ANALYSIS OF THE IMPLEMENTATION OF THE STANDARD ACCOUNTING BUDGETING
AND REPORTING SYSTEM (SABRS) IN THE 4TH MARINE DIVISION

David E. Melchar
Major, United States Marine Corps
B.S., Roger Williams College, 1976

The 4th Marine Division, a member of the U.S. Marine Corps' reserve air/ground team, is hindered in managing its financial resources by unavoidable situations peculiar to the reserve structure and by problems associated with the financial control system presently utilized by the division. A proposed single financial system, the Standard Accounting, Budgeting and Reporting System (SABRS), scheduled for implementation throughout the Marine Corps during FY81 has the potential to remedy many problems. However, the current implementation plan for the division provides extremely limited access to SABRS' benefits. This thesis examines the division's present system, the tenets of SABRS, and the SABRS' implementation plan for the division. Finally, an analysis of two alternative implementation plans for the division results in the identification and recommendation of a plan which provides the division full SABRS benefits at a cost lower than the present system or the current implementation plan.

Master of Science in
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FOREIGN OBJECT DAMAGE IN NAVAL AIRCRAFT ENGINES

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An investigation of historical data was conducted in an attempt to assign a specific cause to each foreign object damage incident reported during an eighteen month period. Interviews were conducted with engineers and fleet maintenance personnel in support of the above research. The impact of current FOD reporting procedures, the foreign objects, the ingestion process and the operating environment are discussed. Conclusions and recommendations are included.

Master of Science in
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AN ANALYTICAL REVIEW OF THE MANAGEMENT OF MODIFICATION FUNDS
IN THE NAVAL AVIATION COMMUNITY

Lonsdale Clifford Mitchell
Lieutenant Commander, Supply Corps, United States Navy
B.A., Hanover College, 1970

This thesis reviews the organizational and managerial structures associated with the United States Navy's fiscal management of the modification of aircraft programs. The review is utilized to highlight the problems associated with the expenditure of appropriated funds in support of the modification effort. After reviewing the organizational, functional and structural areas that support the modification program, five areas are identified for corrective action and analysis. These are: a) inadequate control of funds, b) funding is approved too early, c) temporary reprogramming tends to become permanent, d) lack of understanding by the item managers, and e) inadequate program feedback. Several recommendations are made to improve the quality of funds management in the modification process. Among these recommendations were actions to improve funds control through "fencing" mechanisms, segregation of modification follow-on funds from replenishment funding and to consciously reduce front-end funding of modification programs.

Master of Science in
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CANNIBALIZATION OF THE F-14 and S-3A AIRCRAFT:
A VIABLE LOGISTIC ALTERNATIVE

Kevin M. Myette
Lieutenant, United States Navy
B.S., Georgia Southern College, 1972

This thesis presents the results of an analysis of cannibalization and its effects on the F-14A and S-3A aircraft. The analysis includes cannibalization measurement methodologies, reasons why squadrons cannibalize, a comparison of fleet cannibalization activity and alternatives to cannibalization. Cannibalization is shown not to be a maintenance practice to be avoided at all cost, but rather a viable cost effective alternative to logistic system failures. Additionally, material issue response delays rather than material shortages were found to lead to increased cannibalization.

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USE OF THE TI 59 WITH APPLICATIONS TO
PROBABILITY AND STATISTICAL ANALYSIS

George Russell Nelson
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B.S., Ohio State University, 1971

and

Edgar Emmett Stanton, III
Captain, United States Army
B.S., Florida State University, 1972

This thesis demonstrates through three comprehensive examples, the capabilities of the TI 59 programmable hand-held calculator as an analytical tool. One example is a probability application while the other two examples entail use of the TI 59 in statistical inference and data analysis. The probability example involves the use of the Monte Carlo technique to simulate stochastically the detection, identification and engagement of a cruise missile by an Improved Hawk Air Defense Battery. The second example illustrates a TI 59 program which is designed to analyze sample data. The data used for this illustration were gathered by the authors in an experiment which encompassed the testing of thirty-six male subjects to determine the extent to which their training routines influenced their strength, endurance, and cardiovascular fitness. The third example involves the use of an ANOVA routine and Scheffe's multiple contrasts to demonstrate how the TI 59 may be used to facilitate statistical inferences. The fitness data are also used for this purpose. The intent throughout the thesis is to exemplify the capabilities of the TI 59 as a viable, real world analytical tool rather than emphasize particular results of the simulation or the experiment.

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A COMPARISON OF THE FIT BETWEEN THE ORGANIZATION CLIMATE OF THE
COAST GUARD, THE JOB/CAREER EXPECTATIONS OF BLACK COLLEGE
GRADUATES, AND THEIR PERCEPTIONS ABOUT THE COAST GUARD

Percy Owens Norwood, Jr.
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B.S., Alcorn A&M College, 1968
M.S., Tuskegee Institute, 1970

The purpose of this project was to attempt to answer the questions: Given the present state of the organizational climate of the United States Coast Guard, the job and career expectations of Black college students/graduates, and their perceptions about the Coast Guard; can the Coast Guard realistically expect to recruit and retain enough Black officers to achieve its goal of 12 percent Black officers within the next five years?

Information was gathered from Coast Guard officers and Black college graduates using questionnaires and interviews. Data were obtained from former Coast Guard officers via telephone interviews.

The results of this project revealed that the perceptions and expectations of Black college graduates were generally higher than all Coast Guard officers view of the organizational climate of the Coast Guard. Their perceptions about the Coast Guard are generally positive. Their expectations were higher than their perceptions. Thus the Coast Guard is perceived in a "positive" light as a viable employer by Black college students/graduates. However, the gap that exists between their perceptions of the Coast Guard, their expectations, and "reality" as perceived by Coast Guard officers must be reduced if the Coast Guard is to recruit and retain more Black officers. If only the gap between Black college students/graduates' perceptions and "reality" is reduced, the Coast Guard

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will probably recruit more Black officers; but, because nothing would be done to reduce the gap between their expectations and "reality," there will continue to be retention problems caused by unfulfilled expectations. Thus there will continue to be a shortage of role models and mentors for young Black officers. If the gap between the expectations of Black college graduates and "reality" is reduced significantly so that there is congruence between the two, the retention of Black officers should increase.

A CONCEPTUAL LOGISTIC SYSTEM FOR IRANIAN ENTERPRISE

Mahmoud Nourayi
Commander, Iranian Navy

This project is a survey of the business logistics system. The first part of the thesis describes the concept of logistics and identifies the fundamental logistics considerations and their characteristics for an effective and efficient logistics system.

This thesis is intended for those in or just entering the field of logistic systems who seek to understand and benefit from recent scientific advances in the management of a logistic system but who are not primarily concerned with the detailed mathematical basis of these advantages.

The final chapter presents a conceptual logistics system oriented toward Iranian enterprises.

Master of Science in
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A CONTENT ANALYSIS OF OFFICER PERCEPTIONS OF DETAILING

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B.A., University of Mississippi, 1970
B.S., University of the State of New York, 1981

Navy officer perceptions of the detailing process were investigated by analysis of officer responses to the open-ended portion of the 1980 URL Officer Feedback Survey. Coding results are presented in detail by the respondents' perceptions and evaluation of the interactions with the detailer and the outcome of the negotiations, the effects of the new billet assignment on the officer and his or her family and recommendations offered for modifying and improving the placement/assignment process.

Officers satisfied with detailing tended to receive billet assignments that were communicated to the detailers as a preference. Officers dissatisfied with detailing tended to receive billet assignments that were not a preference. Both satisfied and dissatisfied officers expressed dissatisfaction with delays in receipt of formal orders to facilitate personal planning.

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AN ASSESSMENT OF SELECTED PERFORMANCE OUTCOMES ASSOCIATED WITH THE
DOD CAPITATION BUDGETING DEMONSTRATION (PILOT) PROJECT (1978-1981)

Kenneth Lorin Orloff
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1980

In the early 1970's, rising military health care costs led to congressional interest in alternative health care delivery systems wherein efficiency and cost containment had been successfully demonstrated. As a result of a recommendation of the Military Health Care Study (1975), DOD developed and implemented a pilot capitation budgeting (CB) resource allocation system during 1978-1981. During the subsequent evaluation, a contractor determined that the tested methodology did not result in significant improvements over the traditional budgeting system. Consequently, the demonstration was terminal.

This thesis independently assesses the extent to which results of the demonstration project were predictable. On the basis of theory and experience, a conceptual model for CB was constructed. Selected Pilot Project performance features and design elements were assessed against that model. The study concludes that the performance outcomes associated with the Project were consistent with project design and conduct limitations, and that a decision regarding the employment of CB in the Military Health Services System (MHSS) should not be based on project results.

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AN INTERNATIONAL COMPARISON
OF MILITARY COMPENSATION

Myron Clifford Oyløe
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B.S., North Dakota State University, 1967

This thesis attempts to determine if an international comparison of nominal military wages can provide insight into the problem of retaining mid-career officers, noncommissioned officers, and petty officers in the U.S. military.

The analysis indicates that United States' noncommissioned officers and petty officers are being compensated relatively less than their foreign counterparts but this does not hold for officers. However, because other occupational choice factors are interrelated with compensation, monetary compensation is not the only determinant affecting retention. The relatively higher U.S. officer compensation levels may be insufficient to offset the possibly greater perceived disutility associated with U.S. military service, or U.S. officers may have better opportunities in the civilian sector than their foreign counterparts. The relative cost-effectiveness of other policy variables than compensation may be worth analyzing.

Master of Science in
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AN INVESTIGATION INTO THE NAVY PUBLIC WORKS CENTERS
SPECIFIC WORK SERVICE PROCESSING PROBLEMS

James Glenn Palmborg
Commander, Civil Engineering Corps, United States Navy
B.S., Tufts University, 1966

This thesis is about Navy Public Works Centers (PWC) and the problems associated with specific work service processing. The PWC concept is described with emphasis on the development of PWCs, the organization and mission, accounting and management systems, and the services offered to customers. Specific work service and the related aspects such as scheduling, funding, and contracting are also described in detail.

The thesis research was conducted utilizing the author's past experience with PWCs, interviews with PWC managers, and a survey. The author developed questionnaire was sent to PWC managers and the major PWC customers in order to identify work processing problems.

The survey results are presented relative to the specific work processing steps and a number of conclusions are made such as the need for enhanced customer liaison, more accurate scheduling, better utilization of manpower, and workload management. The discussion identifies factors which must be considered when addressing specific work problems, and suggests that more detailed study be conducted in certain areas.

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THE NAVY INDUSTRIAL FUND AND ITS APPLICABILITY
TO THE NAVAL DATA AUTOMATION COMMAND

Richard Joseph Parish
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The mission of the Naval Data Automation Command (NAVDAC) is to administer and coordinate the Navy non-tactical ADP program. NAVDAC's principal objectives in fulfilling this mission are to improve the effectiveness of Navy ADP systems and to improve the overall management of the Navy's ADP resources. This thesis examines guidelines from the General Accounting Office (GAO) and the Office of Management and Budget (OMB) which indicate a dissatisfaction with the current cost accounting practices within the Navy ADP program. NAVDAC currently operates under the Resources Management System (RMS), and this thesis concluded that their cost accounting system was not designed to meet the GAO guidelines and accumulate the full costs of ADP services necessary to facilitate management decision making. This thesis further concluded that the Navy Industrial Fund (NIF) was a viable alternative to RMS for NAVDAC, and that NIF would meet the GAO guidelines.

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THE ROLE OF THE ARMED FORCES IN THE MEXICAN ECONOMY IN THE 1980's

Vicente Ernesto Perez Mendoza
Lieutenant, Mexican Navy
Graduate of Mexican Naval Academy, 1969

It is common belief that expenditures for defense harm the economic growth of countries. Mexico presents a special case in this respect, because its expenditures on defense expressed as a percentage of its GNP, represent an average of 0.71% in the last thirty years. This thesis provides an awareness of the key role that the Armed Forces have played in Mexico's economic growth. Defense expenditures have not harmed economic growth. Rather, in fulfillment of their duties the Armed Forces produce a spin-off effect in the economy by supplying skilled manpower, education and training, and generating an aggregate demand. The Armed Forces can contribute to the achievement of National objectives without neglecting their military duties through programs of technology, employment, education and training, ship-building, food production and nursing, and social programs.

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THE FEMALE NAVAL OFFICER: A RECRUITER'S GUIDE TO THE AMERICAN WOMAN

Ellen H. Perry
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B.S., University of Miami, 1971

A random sample of 251 women officers currently serving on active duty are studied to determine if similarities exist in background, motivational factors, demographic and attitudinal characteristics. If so, recruiters can utilize this information both to determine whether a woman has a positive propensity toward joining the Navy and also to suggest a "plan of attack" to help find those qualified women who have this tendency to join.

It is found that certain similarities do exist. From these data, it is concluded that recruiters should increase their recruiting efforts on college campuses stressing that the Navy offers travel, careers with opportunities for advancement, good financial compensation and non-traditional as well as traditional "women's" jobs. Additionally, advertising material should be revised to emphasize women officers participating in non-traditional jobs.

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PROPOSED SYSTEM FOR THE USE OF EVALUATION FACTORS
IN THE SOURCE SELECTION OF SERVICE CONTRACTORS

Richard Douglas Pingel
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B.S., Iowa State University, 1969

Technical personnel are increasingly being required to perform vital functions as proposal evaluators in the source selection process for which they have not properly been trained. This resource effort provides a comprehensive system for source selection using price and other factors in a form aimed at the technical professionals that support field acquisition activities. All examples selected are from the general acquisition area of service contracting. The system consists of the basic considerations necessary for preparation of a procurement request, the basic elements of a source selection plan, selection of a technical evaluation panel, selection of evaluation factors for service contractors, preparation of negotiation objectives, the actual conduct of evaluations and negotiations, and debriefing of unsuccessful offerors.

Master of Science in
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AN ANALYSIS OF AND A PRESCRIPTION FOR THE CAPITAL
IMPROVEMENT PROGRAMMING PROCESS FOR SMALL CITIES

Robert Lee Rachor, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

This thesis presents an analysis of and prescription for the capital improvement programming process utilized in many small cities. In this study the author finds two major deficiencies in the literature and the prescriptive manuals. The first is the lack of alternative analysis at the time project requests are developed. The second is a lack of a method to prioritize projects given the political nature of the decision making process in a municipality. The first problem is countered by a proposal to utilize the principles of economic analysis when developing project requests. The second problem is countered by a proposal to utilize a weighted two-dimensional priority matrix to rank project requests. A political rational model of decision making is developed. Techniques for decision making with multiple objectives are reviewed. An example of a programming process currently in use is presented. The conclusion offers a prescription derived from the literature and the recommendations of the author.

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PROGRAMMABLE HAND-HELD CALCULATORS IN
THE OPERATING FORCES OF THE MARINE CORPS

James LeBaron Reeve
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B.S., Iowa State University, 1969

This thesis provides usage and cost data on programmable hand-held calculators (PHHC's) in the operating forces of the U.S. Marine Corps (USMC). In 1978 PHHC's that computerized aircraft performance charts were procured for USMC AV-8A pilots. During 1979, the U.S. Army successfully tested and began procuring a PHHC for use by artillery fire direction centers (FDC's). USMC artillery batteries will receive this PHHC in 1981. In 1980 the Army tested and approved procurement of PHHC's for mortar FDC's. In September 1980, Beech Aircraft Corporation started selling a PHHC module which enabled Super King Air pilots to enjoy 10% fuel savings. In February 1981 Naval Air Systems Command began reviewing a proposal to provide a PHHC for the CH-53E. Each of these systems is described and available cost information is analyzed. In order to do their jobs faster and more accurately, several individuals have written or purchased software for their personal PHHC's. Four examples which have application in the USMC are presented and explained.

Master of Science in
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SEXUAL HARASSMENT IN THE NAVY

Patricia Joanne Reily
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An investigation was made into the subject of sexual harassment, its effect upon Navy personnel and its potential impact upon mission accomplishment.

The study includes: a general historical review; a general discussion of the subject; a discussion of Navy policy to date; a summary of the findings of a survey and interviews of approximately 100 Navy women conducted by the author; and, future projections. The author concludes that sexual harassment is a significant problem in the Navy which could potentially impact upon mission effectiveness.

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OFFICER AND ENLISTED RETENTION BEHAVIOR
UNDER ALTERNATIVE RETIREMENT PLANS

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Lieutenant, United States Navy
B.A.E., University of Mississippi, 1975

This thesis investigates the effects of several possible replacement retirement plans on an individual's expressed propensity to remain on active duty. This was accomplished by comparing the intended retention of individual sample groups both under current retirement policy conditions and after exposure to alternative retirement plans.

Retention intention under the various retirement plans was obtained from the 1978 DoD Survey of Officers and Enlisted Personnel. The entire sample consisted of over 9,000 enlisted and 5,000 officer personnel. The proposed retirement systems contained many characteristics of past and possible future replacement retirement plans.

Results indicated substantial sensitivity of retention propensities to alternative retirement systems. Junior officers and enlisted retention propensities under proposed alternative retirement plans were generally as good or better than current indications. An alternative retirement system can very well yield a future increase in the total officer and enlisted population base and have substantial impact on force structure.

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PRE-CONSOLIDATION SUPPLY DEMAND PATTERNS OF NARF NORTH ISLAND
AND LOCAL CUSTOMERS OF THE NAVAL SUPPLY CENTER SAN DIEGO

James M. Robertson
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B.B.A., Southern Methodist University, 1970

On October 1, 1980 the wholesale supply function of the Naval Air Station, North Island (NAS) was consolidated with that of the Naval Supply Center, San Diego (NSC) according to the recommendation of a Department of Defense Material Distribution System study. This thesis discusses the implementation philosophy of the consolidation and identifies the local customers of the NSC. A baseline of information that documents the preconsolidation supply requirements of the NSC's new major customer, the Naval Air Rework Facility, North Island (NARF) and other local customers is presented. A list of items which are logical candidates for stock in a Ready Supply Store at the NARF and in the automated Navy Integrated Storage Tracking and Retrieval (NISTARS) warehouse at the NSC is developed. The information provided will facilitate improvement of material warehousing and distribution systems at the NSC and establish a basis for measurement of changes in customer service caused by the consolidation.

Master of Science in
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INTERGENERATIONAL OCCUPATIONAL INHERITANCE IN THE NAVY

Katherine Sue Robinson
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B.A., University of Kentucky, 1972

This thesis studies differences between Navy Personnel whose parents have had military service, referred to as juniors and those whose parents did not serve in the military, nonjuniors. Among Navy personnel surveyed in the 1978 DOD Survey, juniors entered the service earlier than nonjuniors, but exhibited few differences from nonjuniors in attitudes toward the military and in career and reenlistment intentions. Juniors of career personnel entered the Navy in proportions up to four times their estimated proportions in the national population, indicating the existence of strong intergenerational occupational inheritance in the Navy.

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AIRTOURS: APPLICATION OF AN INTERACTIVE COMPUTER MODEL TO
ANALYZE THE MANPOWER REQUIREMENTS AND OPERATIONAL TOUR
OPPORTUNITIES OF THE AVIATION WARFARE COMMUNITY

Michael Lynn Scholes
Lieutenant, United States Navy
B.A., University of Washington, 1973

This thesis presents application of an interactive computer model designed for more efficient utilization of available manpower within the Aviation Warfare Community. Officer Master Billet File data are analyzed for the purpose of determining relevant aviation input parameters in five aviation subcommunities, including prop pilots, prop NFO's, jet pilots, jet NFO's, and helo pilots. Specific operational tour structures are defined for each subcommunity and current information for officer inventory and operational billet requirements is used to calculate operational and command tour opportunities or shortfalls for specific tour positions over projected fiscal years for each subcommunity. Model capability is demonstrated by adjusting organization requirements, billet requirements, grade requirements, and tour positions. The model confirms serious aviation shortfalls and provides analysts with the ability to test various manpower planning alternatives.

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RETENTION INTENTION AMONG U.S. NAVY'S ENLISTED PERSONNEL:
AN ANALYSIS OF SOCIAL, ENVIRONMENTAL AND
ECONOMICAL FACTORS

Dan-Norman Siggerud
Lieutenant Commander, Royal Norwegian Navy
Graduate from the Royal Norwegian Naval Academy, 1970

This thesis investigates social, environmental and economical factors that influence the enlistees' decision to reenlist or leave the U.S. Navy. Results are presented both at the aggregate level and for each of the largest ratings separately.

A model for computation of the U.S. Navy's savings by retaining their personnel, along with a sensitivity analysis of some of the involved variables, are also included.

The main conclusions of the study are:

a) Retention controlling policies should be decided upon in accord with separate studies of each rating.

b) It is suggested that pay differentiation and different promotion patterns be established for enlistees with different background and different civilian work opportunities, to make the U.S. Navy more competitive (and to reduce rent for some personnel categories).

c) Objective information to the enlistees about civilian earning opportunities may improve retention.

d) It should be considered to eliminate the contract system after the first four years of service.

e) It should be considered to use a higher proportion of older enlistees at sea duty.

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A SIMULATION ANALYSIS OF THE EFFECTIVENESS
OF MARKOVIAN CONTROL AND BAYESIAN CONTROL

Soo Sup Song
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B.S., Korea Military Academy, 1967

Statistical cost control decisions may be based on two competing decision models. The Markovian Control model controls a process by investigating the process whenever the reported cost exceeds a fixed critical limit. The Bayesian Control model controls a process by using the reported cost to update the probability of the process being in-control and investigate the process whenever such posterior probability is less than a fixed critical value.

This paper compares the relative effectiveness of the two models by a simulation analysis. It is observed that the Markovian Control model performs as well as or better than the Bayesian Control model unless the cost distribution of the in-control state is more dispersed than that of the out-of-control state. It is also observed that the relative effectiveness of the Markovian Control model compared to the Bayesian Control increases as the savings from an investigation increases when the cost distribution of the in-control state is less dispersed than that of the out-of control state.

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THE DEVELOPMENT OF THE ARMY JUNIOR LEVEL FINANCIAL MANAGER

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and

John R. Batiste
Captain, United States Army
B.S., USMA, West Point, 1974

This thesis is an analysis of the degree of job preparation manifested by Army junior level financial managers in their first comptroller related assignments. The research stemmed from a perception, developed from interviews, that all is not well within the comptroller community. It identifies those comptroller functional responsibilities where the young manager has not performed to expectations or where the officers are not adequately prepared to perform their duties. The authors accomplished this research by means of a survey questionnaire and an examination of recent audit report findings on the subject. Functional responsibility shortcomings were identified, prioritized, and analyzed in relationship to the Army financial management system and curricula of ongoing comptrollership courses. The study culminates with a proposal for an Army practical comptrollership course and a financial management intern program designed to deal with the identified comptroller job preparation shortcomings.

Master of Science in
Management
September 1980

Advisor: R. Bobulinski
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CONTRACTOR QUALITY CONTROL

Henry John Turowski, Jr.
Lieutenant Commander, CEC, United States Navy
B.S., United States Naval Academy, 1971

Contractor Quality Control (CQC) is a program whereby contractors awarded construction contracts in excess of \$1 million are expected to assure the quality of their work using a formal system of inspection and documentation. The Navy instituted CQC in 1970.

Since its inception, CQC has been blamed for many of the problems that have arisen in the construction of Naval facilities, and a great many people charged with the administration of CQC have expressed dissatisfaction.

This thesis has researched the attitudes of those persons directly involved in the CQC process. A good deal of confusion and distrust was found to exist, and in many areas CQC has not lived up to its expectations or goals.

The overall conclusion, however, is that CQC is a necessary process, and that, if several minor changes are made, particularly in the education of CQC participants, CQC can become the tool needed by the Navy to effect quality construction in an environment of reduced inspection and administration manpower.

Master of Science in
Management
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Advisor: R. B. Cunningham
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Administrative Sciences

LEADERSHIP AND MANAGEMENT EDUCATION AND TRAINING (LMET)
EFFECTIVENESS: A PILOT STUDY FOR EVALUATION

David L. Vandover
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

and

John P. Villarosa
Lieutenant Commander, United States Navy
B.S., University of North Carolina, 1971

This report describes the design and use of the pilot study concept as a preliminary step in directing Navy program evaluations. This methodology focused specifically upon the Navy Leadership and Management Education and Training Program (LMET) to identify relevant effectiveness issues to provide program managers necessary guidance for overall program evaluation. Interviews of a cross-section of 51 LMET graduates, their immediate supervisor and subordinate were conducted in an effort to determine leadership/management improvement. Results indicate specific recommendations concerning; the use of pilot studies, the interviewing process and LMET evaluation.

Master of Science in
Management
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Advisor: R. I. Harris
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A CONTEST WITHOUT A LOSER: THE DEVELOPMENT OF
THE NAVY'S ALCOHOL REHABILITATION PROGRAM

Lynford S. Walters, III
Lieutenant Commander, United States Navy
B.A., University of South Florida, 1969

The purpose of this thesis is to describe the development and integration of the Alcohol Rehabilitation Program from 1965 to 1980. It shows that throughout this period Naval organizational needs and Alcohol Program needs were being met. It also illustrated that the Navy and Alcohol Program personnel acted in accordance with their own goals and vested interests, both to their mutual benefits. These two different goals were brought together in approximately 1970. Forces responsible were the Vietnam War, selection of Admiral Elmo R. Zumwalt as Chief of Naval Operations and passage of Public Laws 91-616 and 92-129 on alcohol abuse. The leaders of the Alcohol Program utilized these forces well, and through proper management of their Program, it became an established support unit of the Navy.

Master of Science in
Management
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Advisor: R. A. McGonigal
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AN ASSESSMENT OF PUBLIC LAW 95-507

Charles E. White
Lieutenant Commander, Supply Corps, United States Navy
B.S., Prairie View A&M University, 1970
M.P.A., Georgia State University, 1980

P. L. 95-507 has been hailed as the most far-reaching procurement legislation enacted in recent years. This study was undertaken to investigate the impact of this law on the acquisition system within the Department of Defense (DOD).

The results of this study indicate: The law has the potential of both increasing opportunities for small and small disadvantaged businesses as well as assisting them to become viable independent enterprises. Implementation has been slow due to a combination of reasons. There are certain inherent weaknesses in the subcontracting provisions. The implementation/administration has increased procurement administrative lead time (PALT). The most difficult task in administering the subcontracting provisions is determining the acceptability of plans. Contract-by-contract reporting will be burdensome. The costs of implementing/administering the law by the contractor will be generally absorbed by the government.

Master of Science in
Management
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CENTRALIZED ACCOUNTING AND DISBURSING FOR FOREIGN MILITARY
SALES DIRECT-CITE PROCUREMENTS: TEST EVALUATION

Roger Allen Willis
Lieutenant Commander, Supply Corps, U.S. Navy
B.S., Ohio State University, 1970

Foreign military sales (FMS) have grown significantly in dollar volume. The General Accounting Office has accused the Department of Defense (DOD) of a longstanding inability to manage the FMS program, and recently recommended centralization of accounting and disbursing functions as the best long-range solution to the program's problems. Defense subsequently initiated a limited test of centralization at the Security Assistance Accounting Center. The test involves several major direct-cite procurement contracts, and was designed to form the basis of DOD's response to the Congress regarding the centralized concept. This thesis describes and evaluates this ongoing test, in particular, its relevancy towards the decision of whether or not to expand and implement centralization of the FMS program. The study concludes that, although centralization is not a panacea for all the problems of the U.S. foreign military sales program, and cannot be expected to produce instant solutions, it is an advancement. Until a better alternative is developed, centralization should be pursued.

Master of Science in
Management
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COST EFFECTIVENESS ANALYSIS OF HOMEPORTING AN
AIRCRAFT CARRIER IN THE MEDITERRANEAN SEA

Michael J. Worley
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

and

William T. Minges, III
Lieutenant, United States Navy
B.A., California State University at Northridge, 1973

This analysis examines the cost effectiveness of two alternative approaches to providing United States Naval power projection to the Mediterranean Sea. The two alternatives are deploying an aircraft carrier from Norfolk, Virginia, which is the present posture, and homeporting an aircraft carrier in one of two overseas ports--Rota, Spain or Naples, Italy. A cost model, which the authors believe is appropriate for comparing the costs of deployment versus the costs of homeporting overseas for any military unit, is used to perform a differential cost analysis on each alternative. These costs are projected over a ten year period and discounted back to present value. Due to the high cost of dependent travel, and transportation of household goods and privately owned vehicles (POV), the present deployment alternative appears best from a strictly financial viewpoint except when the value of the above cost elements are kept to a minimum. However, the possibilities of limiting dependent travel and extending tour length, and nonquantifiable factors such as increased retention could shift the recommendation in favor of homeporting.

Master of Science in
Management
September 1981

Advisor: R. Bobulinski
Department of
Administrative Science

ACQUISITION STRATEGIES FOR PURCHASING BULK PETROLEUM IN DOD

James Edward Wright
Captain, United States Army
A.B., Indiana University, 1970

The Defense Fuel Supply Center (DFSC) has, in the recent past, been unable to obtain sufficient offers to satisfy all of its bulk fuel requirements. Many issues have contributed to this procurement problem. Defense contracting is a synthesis of laws, regulations and administrative procedures, for instance. Other contributors are socio-economic clauses, submission of cost or pricing data, lower profit margins on JP-4, and more.

The author examines the issues and possible alternatives in conjunction with the structure, conduct and performance of the petroleum industry. DFSC has already initiated several changes to improve the contracting process. Still, DFSC faces a seller's market with no available substitutes for fuel. Inadequate planning and management of the Naval Petroleum Reserve and the Strategic Petroleum Reserve have compounded this disadvantage. Despite these limitations, DFSC has some good options available to it.

Master of Science in
Management
December 1980

Advisor: D. C. Boger
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Administrative Sciences

MASTER OF SCIENCE

IN

MECHANICAL ENGINEERING

A PRELIMINARY INVESTIGATION OF THE CORROSION AND
STRESS CORROSION SUSCEPTIBILITY OF THERMOMECHANICALLY
PROCESSED HIGH MAGNESIUM, ALUMINUM MAGNESIUM ALLOYS

Larry Edward Beberdick
Lieutenant, United States Navy
B.S.E.E., Purdue University, 1974

The stress corrosion cracking susceptibility and general corrosion characteristics of four thermomechanically processed high-Magnesium, Aluminum-Magnesium alloys were evaluated and compared to those of 7076-T6. Results obtained from stress-corrosion testing and from tension testing after stress-corrosion exposure indicate that these 8-10% Mg alloys are less susceptible to stress-corrosion cracking than 7075-T6. The addition of Cu or Cu and Mn to a 10% Mg alloy raises strength, homogenizes the microstructure and reduces the tendency of such an alloy to exhibit intergranular cracking and exfoliation, especially in a sensitized condition. Results of accelerated general corrosion testing and marine exposure both indicate that binary 8% Mg and 10% Mg alloys are highly resistant to corrosion. Alloying with Cu or Cu and Mn accelerates weight loss but to a lesser degree than observed for 7075-T6.

Master of Science in
Mechanical Engineering
September 1981

Advisor: T. R. McNelley
Department of
Mechanical Engineering

FATIGUE CHARACTERISTICS AND MICROSTRUCTURAL
ANALYSIS OF THERMOMECHANICALLY PROCESSED,
HIGH-MAGNESIUM ALUMINUM-MAGNESIUM ALLOY

Charles A. Cadwell, Jr.
Lieutenant, United States Navy
B.S.M.E., Kansas University, 1975

This research was an investigation of the fatigue characteristics of warm rolled high-magnesium aluminum-magnesium alloys. Particular emphasis was placed on study of the microstructural changes which occur during cyclic loading. The study was conducted utilizing a simple binary alloy, Al-10.2 wt pct Mg, and a ternary Al-8.14 wt pct Mg-0.40 wt pct Cu Alloy. Both alloys were given similar processing; in particular, both alloys were examined for two rates of quenching to determine the effect of cooling rate from the homogenization temperature on the tensile properties and fatigue characteristics of the alloys.

The primary strengthening mechanism in the high-magnesium aluminum-magnesium alloys was determined to be the dislocation substructure developed during warm rolling. In fatigue, the Al-10.2 wt pct Mg alloy appears to exhibit an endurance limit, with a fatigue strength to yield strength ratio in excess of 0.6 in the oil-quenched condition. Microstructural refinement achieved through more rapid quenching or through alloying additions was found to degrade the fatigue response although providing improved strength and ductility.

Master of Science in
Mechanical Engineering
June 1981

Advisor: T. R. McNelley
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Mechanical Engineering

IN-SITU MICROSCOPIC STUDIES OF DEFORMATION

Richard Campbell
Lieutenant Commander, United States Navy
B.S.M.E., University of Idaho, 1972

The design and construction of an experimental strain/heating stage for the Cambridge Stereoscope Scanning Electron Microscope is reported. The stage is of the parallel crosshead type driven by opposed power-screw-pairs. Complete machine drawings for the major components of the stage are included. The design has been tested by carrying out experiments on shape-memory-effect alloys and annealed brass specimens.

Master of Science in
Mechanical Engineering
March 1981

Advisor: J. Perkins
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Mechanical Engineering

THE EFFECTS OF SIMULATED WELDS ON HY-130 CAST
AND WROUGHT PLATE AND WELD METAL MICROSTRUCTURE

Paul E. Cincotta
Lieutenant Commander, United States Navy
B.S., University of California 1972

The microstructure and hardness of simulated welds in HY-130 cast plate, wrought plate and weld filler metal are investigated. The dependence of these quantities on the austenitizing temperature and the tempering provided by subsequent weld passes is also investigated. The use of a tempering parameter, as developed by Hollomon and Jaffe, allows comparison of different tempering times and temperatures. It was found that in the rapid heating cycle of simulated welding that the AC1 and AC3 temperatures are approximately as much as 150 to 170 °F higher than the corresponding temperatures of the equilibrium phase diagram for this 0.1% C-5.0% Ni steel. Results indicate that cast plate tends to resist tempering more than either the rolled plate or weld metal. Additionally, structures formed at lower austenitizing temperatures temper more readily. Although all three conditions tempered, the cast plate retained a steep hardness and microstructural gradient through the HAZ and consequently is probably more susceptible to a metallurgical notch effect.

Master of Science in
Mechanical Engineering
September 1981

Advisor: K. D. Challenger
Department of
Mechanical Engineering

COMPUTER EVALUATION OF THE ON-AND-OFF-DESIGN
PERFORMANCE OF AN AXIAL AIR TURBINE

Robert Cirone
Lieutenant, United States Navy
B.S.M.E., University of Notre Dame, 1973

An existing code for calculating axial turbine performance using multiple stream surfaces was modified and made to run on the equivalent of an HP-1000 computer system. Calculations were made for the geometry of a 485 horsepower dual-discharge air-drive turbine for both on-and-off-design conditions. The results were compared with available data obtained at off-design speeds. Agreement of the flow rate and horsepower to within 5% was obtained.

Master of Science in
Mechanical Engineering
March 1981

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Aeronautics

PERFORMANCE OF MULTIPLE, ANGLED NOZZLES
WITH SHORT MIXING STACK EDUCTOR SYSTEMS

Charles Carver Davis
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

Cold flow tests were conducted on a four-nozzle gas eductor system to evaluate the feasibility of reducing mixing stack lengths by the application of angled primary flow nozzles. Three short mixing stacks with length to diameter ratios of 1.75, 1.5, and 1.25 were tested using a set of straight nozzles and a series of angled nozzles having tilt angles of 10, 15, 20, and 22.5 degrees. The nozzles were constructed with an area of primary flow to area of mixing stack ratio of 2.5. Pumping coefficients, mixing stack pressure distributions, flow changes, exit velocity profiles, and back pressures were used to evaluate the various mixing stack length and angled nozzle combinations. A preferred combination was obtained, which, when compared with a longer mixing stack with a length to diameter ratio of 2.5 using straight nozzles, showed equal pumping coefficients and comparable mixing stack pressure distributions while actually improving the mixing. Back pressure increases for the preferred combination of short mixing stack and angled nozzles were slightly greater than for the longer mixing stack with straight nozzles.

Master of Science in
Mechanical Engineering
September 1981

Advisor: P. F. Pucci
Department of
Mechanical Engineering

THE EFFECT OF CONDENSATE INUNDATION ON CONDENSATION
HEAT TRANSFER IN TUBE BUNDLES OF MARINE CONDENSERS

Ismail Demirel
Lieutenant, Turkish Navy
B.S.M.E., Naval Postgraduate School, 1979

Experiments, under different conditions, were conducted to evaluate the effect of condensate inundation on condensation heat transfer in tube bundles of marine condensers. Five 15.9 mm. (5/8 in) nominal outside diameter, smooth stainless steel tubes were used in a vertical row to simulate an actual condenser. Tubes were located in an equilateral triangular array with a spacing-to-diameter ratio of 1.5.

Heat transfer performance was determined for each tube in a bundle. Data was taken for condensing steam on the outside of each tube at about 21 KPa (3 psia) and at about 101 KPa (14.7 psia). Each tube was cooled by water on the inside at velocities of 0.78 to 6.22 m/sec (2.56 ft/sec to 20.42 ft/sec). The overall heat transfer coefficient was determined directly from experimental data. The inside and outside heat transfer coefficients were determined using the Wilson plot technique.

Observation of condensate flow showed lateral droplet motion along the first three tubes in portions of the condenser under all conditions tested. Side drainage occurred only over the third and fourth tubes at a condensation pressure of about 21 KPa. The dominate mode of the flow at 101 KPa condensation pressure was gravitational flow. Outside heat transfer coefficients were higher than expected under all conditions when compared to the Nusselt theory. The reason for this is possibly due to secondary vapor flow. Recommendations to improve validations are provided.

Master of Science in
Mechanical Engineering
December 1980

Advisor: P. J. Marto
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Mechanical Engineering

LOW-RANGE AIRSPEED SENSORS

Ralph E. Duncan
Lieutenant, United States Navy
B.S., University of New Mexico, 1974

The work reported herein is comprised of two parts: A critical assessment of the existing low airspeed sensors for helicopters and V/STOL aircraft and the development of two-dimensional jet-interaction velocity sensors.

The theory of operation, system description, associated electronics, advantages and disadvantages, and the development stage of the existing sensors (pitot-static system, optical convolution velocimeter, low range orthogonal airspeed system, omnidirectional low-range airspeed sensor, swivelling probe air data system, and the fluidic velocity sensor) have been critically discussed.

The need to develop a low-air-speed sensor with no moving parts and a relatively linear sensitivity throughout the operating range and without excessive electronic amplification of the pressure signal led to the exploration of the jet-interaction principle. This culminated in the development of a two-dimensional sensor with extremely encouraging results. Continued design and development will be required to bring the jet-interaction sensor to the point of field tests with helicopters and V/STOL aircraft.

Master of Science in
Mechanical Engineering
December 1980

Advisor: T. Sarpkaya
Department of
Mechanical Engineering

THE BI-PHASE NOZZLE

Michael E. Flenniken
Lieutenant Commander, United States Navy
B.S., University of Nebraska, 1971

The purpose of this effort was to gain an insight into the Bi-phase cycle concept and to develop an experimental facility to test the key component of this power cycle--the Bi-phase nozzle. A system was developed and checked out that allows testing different Bi-phase nozzle shapes. The experimental system is provided with sufficient instrumentation to allow for the determination of the nozzle performance. In addition to the standard gas and liquid flow rates, measurement provisions exist for survey of the nozzle exit plane. Measurements can be made for the gas/liquid ratio and velocities at the nozzle exit.

Master of Science in
Mechanical Engineering
September 1981

Advisor: J. Sladky
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THE EFFECTS OF JET EXHAUST BLAST IMPINGEMENTS
ON GRAPHITE-EPOXY COMPOSITES

John Michael Hampey
Lieutenant, United States Navy
B.S.M.E., Ohio State University, 1975

The effect of jet exhaust blasts on graphite epoxy composites (Hercules 3501-6/AS4) is examined. The material degradation of the composites is determined by means of the short beam shear test. The jet exhaust tests were designed to test the worst case conditions for an F-18 aircraft operating off an aircraft carrier. Results indicate that the composites show no significant property changes if the temperature is maintained less than 230°C. At temperatures in excess of these, strength degradation occurs. It was also observed that when strength degradation occurs, obvious discoloration and delamination of the composite are evident.

Master of Science in
Mechanical Engineering
June 1981

Advisor: D. Salinas
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Mechanical Engineering

DESIGN AND VALIDATION OF AN APPARATUS FOR HIGH TEMPERATURE
FATIGUE TESTING IN AN INERT ENVIRONMENT

William Aaron Hastie, Jr.
Captain, United States Army
B.S., United States Military Academy, 1974

A synergistic interaction between creep and fatigue in structural materials at high temperature has previously been shown to exist. More recently, the importance of environmental effects on fatigue has been shown to frequently overshadow the creep-fatigue interaction. As both creep and environmental effects are temperature and time dependent, the role of each is often difficult to separate. The topic of this thesis is the design and validation of an apparatus to study the interactions of environment and creep with fatigue damage at high temperature.

The alloy $2\frac{1}{4}$ Cr - 1 Mo steel was selected for testing to validate the system as considerable creep-fatigue data exist on this alloy. Strain controlled fully reversed testing was conducted at temperatures of 482° (900°) and 538° (1000°). The results of the testing at 1% total strain range agreed with published data from the same heat of material. Differences in results at 0.5% total strain range were, however, found to exist. The differences are believed to be due to different specimen geometries used by other studies. This research used uniform gage length instead of the standard hourglass specimens used by others. The uniform gage length samples have a lower fatigue life at the low strain range than published data. The results from uniform gage length samples are believed to be a better representation of a materials bulk fatigue behavior.

Master of Science in
Mechanical Engineering
September 1981

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Mechanical Engineering

INVESTIGATION OF HEAT TRANSFER IN STRAIGHT AND CURVED
RECTANGULAR DUCTS FOR LAMINAR AND TRANSITION FLOWS

Robert George Holihan, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

An experimental investigation was conducted to examine convection heat transfer in a duct of rectangular cross-section, having both a straight and curved flow passage. One wall was kept at a constant temperature, with the opposite wall being adiabatic. Heating of the air flowing in the channel was accomplished through Joulean heating of a wall composed of Tensheet.

The experiments were conducted for steady state in Laminar and Transition flows. Development and propagation of the Taylor-Gortler vortices was shown to enhance the heat transfer rate in the curved section as compared to the straight section.

Master of Science in
Mechanical Engineering
June 1981

Advisor: M. D. Kelleher
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Mechanical Engineering

THE EFFECT OF CIRCUMFERENTIAL TUBE WALL HEAT CONDUCTION UPON
LAMINAR FILMWISE CONDENSATION ON THE OUTSIDE OF CONDENSER TUBES

Howard Michael Holland
Lieutenant Commander, United States Navy
B.S.M.E., United States Naval Academy, 1972

This thesis describes the results of a theoretical study to predict the thermal behavior of an internally-cooled tube in a condensing vapor.

The analysis constitutes a unique application of the finite element method and provides new insights into the effects of circumferential conduction upon condenser tube performance. Comparisons are made between the present analysis and the theoretical and experimental works of others. The inclusion of circumferential conduction leads to an improvement in the predictive capabilities of the analytical model.

Master of Science in
Mechanical Engineering
December 1980

Advisor: R. H. Nunn
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Mechanical Engineering

THE STUDY OF A ROTATING HEAT PIPE COOLED ELECTRIC MOTOR

Gerhard Otto Immel
Lieutenant Commander, Federal German Navy

The steady state temperatures of a conventional, 15 HP electric motor were compared to those of a rotating heat pipe cooled motor under identical loading conditions. Fourteen thermocouples were used to measure temperatures at various locations within the motor. Seven of these were placed in rotating parts of the motor and were recorded through a mercury slip ring unit. Tests were made with the electric motor in its original configuration (i.e. with a solid shaft), with its solid shaft replaced by a rotating heat pipe, and with this heat pipe unit containing segmented external fins to increase air cooling.

The modifications did not show a decrease of motor temperatures. This was probably due to a lack of cooling air through the motor casing. Recommendations for future work are included.

Master of Science in
Mechanical Engineering
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Advisor: P. J. Marto
Department of
Mechanical Engineering

ANALYTICAL TREATMENT OF GRAVITY EFFECTS ON
GAS LOADED VARIABLE CONDUCTANCE HEAT PIPES

David Charles Kane
Commander, United States Navy
B.A., St. Ambrose College, 1962

The formulation of a one-dimensional analytical model representing steady state operation of a vertically oriented gas loaded variable conductance heat pipe is presented. The model includes not only the effects of binary mass diffusion and axial pipe-wall conduction, but also gravitational effects which exist at the vapor-gas interface region when the molecular weights of the working fluid and the noncondensable gas differ significantly. Analytical expressions for the transport processes (mass, momentum, and energy) along with equations of state result in a system of ten equations which describe steady state operation of the device. Combining these expressions yields a system of two simultaneous highly non-linear differential equations. These equations are non-dimensionalized and set up for numerical integration using a variable step fourth order Runge Kutta method as part of IBM's Continuous System Modeling Program (CSMP).

Master of Science in
Mechanical Engineering
December 1980

Advisor: M. Kelleher
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Mechanical Engineering

IMPULSIVELY-STARTED FLOW ABOUT SUBMARINE-SHAPED BODIES

Howard Keith Kline
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

Impulsively-started flow about a D-shaped body, a T-shaped body, and a flat plate has been investigated. The forces and moments acting on the bodies have been determined as a function of the relative displacement of the fluid at a subcritical Reynolds number for various angles of attack.

The results have shown that the shedding of the first two or three vortices and the manner in which they are generated have profound effects on all the characteristics of resistance. The evolution of the vortices and hence, the forces significantly depend on whether the separation points are fixed or mobile, or a combination thereof. The data presented here are expected to form the basis for future numerical analyses of the characteristics of time-dependent flow about bluff bodies. At present, accurate analytical and numerical data for comparison with those presented herein, do not exist.

Master of Science in
Mechanical Engineering
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Advisor: T. Sarpkaya
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Mechanical Engineering

NUCLEATE POOL BOILING OF HIGH DIELECTRIC
FLUID FROM ENHANCED SURFACES

Victor Joseph Lepere, Jr.
Lieutenant, United States Navy
B.S., Marquette University, 1974

Experimental results of the heat transfer performance of three enhanced heat transfer surfaces, a Union Carbide Linde High Flux, a Hitachi Thermoexcel-E, a Wieland Gewa-T, and a plain copper surface in the nucleate pool boiling regime in R-113 and FC-72 are presented.

Prior to obtaining the data, each of the surfaces was subjected to one of three initial conditions, and the effect of past history on boiling regime in R-113 and FC-72 are presented.

Prior to obtaining the data, each of the surfaces was subjected to one of three initial conditions, and the effect of past history on boiling incipience was observed.

The data showed that all the surfaces behaved in a similar manner prior to the onset of boiling. Temperature overshoots were most pronounced for the initial condition in which the surfaces were submerged in the liquid pool overnight. All of the enhanced surfaces exhibited a two to tenfold increase in the heat transfer coefficient when compared to the plain surface. The High Flux surface was most effective over a broad range of heat fluxes. The Hitachi surface showed a similar gain in heat transfer coefficient to that of the High Flux surface below 10 kW/m^2 , while the Gewa-T surface was not as effective as the other surfaces at low heat fluxes. At high fluxes, the Gewa-T surface performed in a comparable if not better manner.

Master of Science in
Mechanical Engineering
December 1980

Advisor: P. J. Marto
Department of
Mechanical Engineering

THE EFFECT OF CANISTER GEOMETRY ON THE EFFECTIVENESS OF
REMOVING CARBON DIOXIDE WITH A CONSTANT MASS OF SODA LIME

Peter Eric Loudon
Lieutenant Commander, United States Navy
B.S.Ch.E., University of Nebraska, 1971
P.E., State of Delaware

An investigation was conducted of the effect of canister geometry on the effectiveness of a constant mass of a commercial soda lime, Sodasorb, to absorb carbon dioxide from a mixture of carbon dioxide and air. A comparison of cylindrical canister with length-to-diameter ratios of 0.15, 0.29, 0.44, 0.80, 1.16, and 2.125 was completed with a constant mass of three pounds of Sodasorb. Annular ring baffles and disk baffles were employed to get a more evenly distributed usage of the Sodasorb with the results compared to the 'straight' through type canisters for the above L/D ratios. A steady flow rate of approximately 2.1 SCFM of saturated air with six percent carbon dioxide at one atmosphere and environment temperature of 70 degrees F was used. It was found that annular ring baffles and disk baffles increased the effectiveness significantly.

Master of Science in
Mechanical Engineering
December 1980

Advisor: P. F. Pucci
Department of
Mechanical Engineering

ANALYSIS OF COMBUSTION OF A COMPOSITE PLATE

Robert Emmett Luby, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973
M.E.M., Northwestern University, 1979

The combustion of a porous graphite fiber plate is analyzed. A transient one-dimensional, mathematical model is utilized to conduct numerous computer tests. The model simulates the thermal response of a porous graphite fiber plate and it is based on appropriate energy equations. Two of the energy equations are based on energy balances conducted on both the porous structure and on the air within the graphite fibers. The third energy equation is based on a mass balance performed on a differential volume of porous medium.

A test plan is formulated and computer test runs are conducted to investigate the effects of plate thickness, filament diameter, permeability, porosity and exterior wind velocity on the thermal response of the porous graphite fiber structure. The test results are analyzed and conclusions are presented.

Master of Science in
Mechanical Engineering
June 1981

Advisor: D. Salinas
Department of
Mechanical Engineering

ENGINEERING DESIGN OPTIMIZATION BY THE
AUGMENTED LAGRANGE MULTIPLIER METHOD

Leroy E. Madsen
Lieutenant, United States Navy
B.S.E.E., Purdue University, 1974

A computer program was developed for solving equality and inequality constrained optimization problems by the Augmented Lagrange Multiplier method. The program was developed specifically for use in engineering design.

The historical evolution and theoretical development of the multiplier method is presented. Several examples are used to demonstrate the effects of penalty parameters and multipliers on the convergence and accuracy of the method. Computational experience with variations to the method is documented.

A brief literature search of the multiplier method's application to engineering design is summarized. The method is demonstrated with several mathematical and engineering examples. A comparison to classical penalty methods and the method of feasible directions was performed in each case.

Master of Science in
Mechanical Engineering
March 1981

Advisor: G. N. Vanderplaats
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Mechanical Engineering

A COMPUTER STUDY OF THE EFFECT OF ICE CLOUDS
ON THE CEP OF A ZERO-LIFT REENTRY BODY

Martin Warren Mellor
Lieutenant Commander, United States Navy
B.S., Purdue University, 1972
M.S., University of Southern California, 1978

The reentry trajectory of a bluff zero-lift reentry body was computed using an HP-9845A computer. To obtain the external shape of an ablating reentry body as a function of altitude, coefficients for polynomial equations were determined. At six discrete altitudes, the calculated nose shapes were identical to published information for the nose shapes of a reentry body with silaceous ablation material. Newtonian flow and an exponential atmosphere were assumed throughout.

The computer program was modified to include ablation due to ice crystal erosion, and the trajectory was recalculated for a model ice cloud 5,000 feet thick at an altitude of 30,000 feet. A total of four trajectories was computed for various values of mass loss fraction for erosion due to ice. The differences in range from the initial trajectory without ice erosion were one to fifteen feet.

Master of Science in
Mechanical Engineering
December 1980

Advisor: A. E. Fuhs
Department of
Mechanical Engineering

PARTICLE FLOW CELL FORMATION AT MINIMUM FLUIDIZATION
FLOW RATES IN A RECTANGULAR GAS-FLUIDIZED BED

Michael Charles Morgan
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

This study was conducted at the Naval Postgraduate School to investigate the formation of particle flow cells at minimum fluidization gas flow rates in a rectangular gas-fluidized bed. The primary objective is to determine if multiple cell formation occurs as the bed width to height ratio increases. The settled bed height is maintained at a constant level for all runs. The secondary objective is to determine if the presence of external plate heaters at the end walls of the particle bed will alter the particle flow cell formation patterns when energized and to what extent they affect the fluid mixing (heat transfer) flow patterns within the particle flow. Pressure measurements across the bed are used to determine minimum fluidization points and thermocouple probe measurements determined the thermal gradients within the bed for each bed configuration. Visual observations in the external bed movement are included in the determination of the results of this experimental study.

Master of Science in
Mechanical Engineering
March 1981

Advisor: P. F. Pucci
Department of
Mechanical Engineering

A TEST CONDENSER TO MEASURE CONDENSATE
INUNDATION EFFECTS IN A TUBE BUNDLE

Roger Harold Morrison
Lieutenant, United States Navy
B.S.M.E., University of New Mexico, 1973

A test condenser was designed and constructed to provide a means to evaluate the effects of condensate inundation on enhanced condenser tubing. Fifteen horizontal tubes were used to form a square inline tube matrix three tubes across and five tubes high with a spacing to diameter ratio of 1.5. The center column of active tubes was made of 16 mm O.D. half hard copper. They were flanked by full round 16 mm O.D. stainless steel dummy tubes.

Smooth tubes were utilized to validate the operation of the system. A new method of data reduction was developed to increase experimental accuracy. This was accomplished by measuring actual tube wall surface temperatures so that the steam side heat transfer coefficient could be calculated directly. This approach replaces the complexity and inaccuracies of the Wilson Plot technique.

Validation of system operation was successfully accomplished using steam at 253 mm Hg absolute. Recommendations to improve the test condenser are provided.

Master of Science in
Mechanical Engineering
March 1981

Advisor: P. J. Marto
Department of
Mechanical Engineering

STUDIES OF THE LOW TEMPERATURE HOT
CORROSION OF UNCOATED SUPERALLOYS

Garry D. Newberry
Lieutenant, United States Navy
B.S., University of Louisville, 1975

Several nickel-based superalloys used in the manufacture of gas turbine hot section components were investigated to determine potential alloying element effects on the uncoated alloy's resistance to low temperature hot corrosion (LTHC). In addition, the nickel-based alloy IN 738 was modified with one and two percent concentrations of hafnium to evaluate the effect of this active element on LTHC resistance.

The alloys were ranked into groups of good, moderate or poor, regarding their resistance to LTHC. Relatively high chromium contents were found to be beneficial while relatively high contents of cobalt were unexpectedly determined to be detrimental. The LTHC resistance on IN 738 was improved by small additions of hafnium.

This program also showed that the Naval Postgraduate School hot corrosion furnace reproduced the corrosion patterns seen on uncoated alloys in burner rigs and industrial gas turbines.

Master of Science in
Mechanical Engineering
September 1981

Advisor: D. H. Boone
Department of
Mechanical Engineering

NUMERICAL OPTIMIZATION FOR INTERNAL EXPANDING BRAKE

Mordechai Peer
Major, Israeli Army
B.S., Technion, Haifa Israel, 1970

This report deals with design optimization of Internal-Expanding Rim Brakes. A computer program was developed to calculate the actuating force, torque, stopping time and drum temperature. The drum temperature is calculated by the finite difference method.

A comparison of results has been made using a simplified equation that is in common use in engineering texts.

Numerical optimization is shown to be a convenient tool for brake design.

Master of Science in
Mechanical Engineering
March 1981

Advisor: G. N. Vanderplaats
Department of
Mechanical Engineering

COMPARISON OF VISCOUS AND PRESSURE ENERGY
EXCHANGE IN FLUID FLOW INDUCTION

Harry Joseph Rucker, Jr.
Lieutenant Commander, United States Navy
B.S.O.E., United States Naval Academy, 1973

The pumping power and efficiency of a jet pump can be substantially increased by introducing a rotating primary flow. The rotating primary causes an energy transfer from the primary fluid to the secondary fluid through a pressure force. Non-rotating jet pumps transfer energy through viscous friction. The reversible nature of the work accomplished through a pressure exchange is inherently more efficient than the non-reversible work accomplished through viscous interaction. This study focuses on the interaction zone of the inducer and specifically on an experimental comparison of viscous and pressure energy exchange.

Master of Science in
Mechanical Engineering
June 1981

Advisor: J. Sladky
Department of
Mechanical Engineering

FLOW CHARACTERISTICS OF A MULTIPLE NOZZLE
EXHAUST GAS EDUCTOR SYSTEM

Dennis Leo Ryan III
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

Cold flow tests of a four nozzle eductor system were conducted to evaluate the flow characteristics of several mixing stack configurations. A previously tested mixing stack design used a plug to shield the primary flow nozzles from view. Flow visualization was used to determine the flow pattern in the stack. The results of the visualization runs were then used to modify the mixing stack geometry. The eductor system flow characteristics were evaluated in terms of non-dimensional parameters governing the flow phenomena from a one dimensional analysis of a simple eductor system. The eductor system's pumping capacity was improved over that of the previously tested unmodified mixing stack.

Master of Science in
Mechanical Engineering
March 1981

Advisor: P. J. Pucci
Department of
Mechanical Engineering

OPTIMIZATION OF A LOW ΔT RANKINE POWER SYSTEM

Raymond C. Schaubel
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

The Ocean Thermal Energy Conversion (OTEC) uses the low thermal energy potential available from ocean temperature gradients. A method is presented to analyze such systems and, for this purpose, a comprehensive simulation is developed. The simulation includes parasitic power requirements, losses due to interconnecting lines, and heat exchanger pressure drops. Cost functions are included and numerical optimization is employed to obtain optimal designs based upon minimum cost. The analysis is converted to a computer code and coupled to the COPES/CONMIN optimization code to facilitate a fully automated design where the computer makes the design decisions and performance trade-off studies. The final product is an optimum power system module design for the designated net electrical output required and the specified system and design constraints.

Preliminary results are presented for a range of system power levels. Optimum designs are obtained and compared for systems in which either titanium or aluminum tubes are used in the heat exchanges.

Master of Science in
Mechanical Engineering
December 1980

Advisor: R. H. Nunn
Department of
Mechanical Engineering

FREE CONVECTION FROM A SEMI-INFINITE VERTICAL PLATE
WITH DISCONTINUOUS BLOWING OR SUCTION

William Andrew Schiesser
Lieutenant Commander, U.S. Navy
B.A., Knox College, 1969
M.A., University of Wisconsin, 1971

An analytical investigation of laminar free convection from a semi-infinite vertical plate is undertaken with the following special conditions imposed. The plate is maintained at a constant temperature greater than that of the ambient fluid. At an arbitrary distance above the leading edge, a constant rate of blowing or suction is initiated extending uniformly along the remainder of the plate. The solution was obtained using the method of matched asymptotic expansions whereby an inner series described the velocity and temperature profiles near the discontinuity in the vicinity of surface and an outer series approximated the behavior at greater distances from the plate. The inner series was also used to determine the heat transfer characteristics at the surface of the plate. The ambient fluid was assumed to be air with a Prandtl number of 0.72.

Master of Science in
Mechanical Engineering
March 1981

Advisor: M. D. Kelleher
Department of
Mechanical Engineering

EFFECT OF THERMOMECHANICAL TREATMENT ON THE
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF
AISI 52100 STEEL

Clarence W. Schultz
Lieutenant, United States Navy
B.S.M.E., University of Texas, 1974

The effects of various thermo-mechanical treatments on the microstructure and mechanical properties of AISI 52100 steel have been investigated using a combination of optical and transmission electron microscopy in conjunction with standard mechanical testing. The response of the as-treated material to various hardening and tempering treatments has been determined and compared to that of material processed using a standard commercial technique.

The results indicate that the thermo-mechanical treatments examined refine the microstructure and increase the tensile strength of AISI 52100 steel. Using these treatments allows processing of the steel to be accomplished at lower austenitizing temperatures and in shorter times than in currently utilized techniques. Additionally, the degradation of mechanical properties by time at various tempering temperatures is reduced.

Master of Science in
Mechanical Engineering
June 1981

Advisor: T. R. McNelley
Department of
Mechanical Engineering

PERFORMANCE OF A MULTIPLE NOZZLE EXHAUST GAS
EDUCTOR SYSTEM FOR GAS TURBINE POWERED SHIPS

Richard Steward Shaw
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

Cold flow tests of a four nozzle eductor system were conducted to evaluate the performance of a new mixing stack configuration. The new design employed the placement of a symmetrical plug in the mixing stack to shield the primary flow nozzles. After initial testing, the mixing stack configuration was modified by adding film cooling ports and a shroud to the plug. The eductor system performance was evaluated in terms of non-dimensional parameters governing the flow phenomena from a one-dimensional analysis of a simple eductor system. The measured axial pressure distribution was sufficient to provide film cooling, however, the eductor system's pumping capacity was moderately reduced from that of a previously tested cylindrical mixing stack models.

Master of Science in
Mechanical Engineering
December 1980

Advisor: P. F. Pucci
Department of
Mechanical Engineering

A CORRELATION BETWEEN THE HEAT AFFECTED ZONE MICROSTRUCTURE
AND THE THERMAL HISTORY DURING WELDING OF HY-130 STEEL

Michael Joseph Sorek
Lieutenant Commander, United States Navy
B.S. Eng., Purdue University, 1973

A study of microstructure as a function of distance from the fusion line was conducted for an instrumented weld in HY-130 steel plate. Thermocouples were positioned in the plate at various distances from the fusion line and were used to obtain the welding thermal history at these locations. A correlation was then developed between the microstructures observed and the thermal history experienced. Additionally, the tempering of the heat affected zones of the initial weld passes by subsequent weld passes was calculated and correlated with hardness and microstructure data. Finally, a further study of the "metallurgical notch" phenomenon postulated by Brucker was undertaken.

Master of Science in
Mechanical Engineering
September 1981

Advisor: K. D. Challenger
Department of
Mechanical Engineering

THE EFFECT OF GRAIN AND CARBIDE REFINEMENT ON THE ISOTHERMAL
TRANSFORMATION CHARACTERISTICS OF AISI 52100 STEEL

Duane M. Tufte
Lieutenant, United States Navy
B.S., University of Kansas, 1975

A study of the microstructure and mechanical properties of isothermally-transformed AISI 52100 bearing steel was conducted. Standard spheroidized annealed and thermomechanically grain-refined materials were compared. Heat treatment consisted of austenitization at 850°C, followed by isothermal transformation at 350°C, 275°C or 250°C. Hardness, retained austenite, and optical and transmission electron microscopy data were obtained as a function of isothermal transformation time. Tensile test results also were obtained on selected conditions. It was found that isothermal holding above M_s resulted in comparable hardness values for both materials. Retained austenite remained low for all cases but did tend to increase as the M_s was approached. Microstructural analysis revealed that the fine-grain structure of the refined material was retained throughout the transformations while little or no difference in the carbide structure was noted. Tensile results show that the refined and transformed material exhibits greater strength and ductility.

Master of Science in
Mechanical Engineering
September 1981

Advisor: T. R. McNelley
Department of
Mechanical Engineering

MECHANISMS OF ELEVATED TEMPERATURE FATIGUE
DAMAGE IN 2 1/4 CR - 1 MO STEEL

Pierre G. Vining
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973

The microstructural changes and fatigue crack growth rates induced by elevated temperature push-pull fatigue and creep fatigue tests in a 2 1/4 Cr - 1 Mo steel have been examined using optical and electron microscopy techniques. The only microstructural change noted was the development of dislocation substructures in the proeutectoid ferrite. Creep fatigue tests with a single maximum strain hold period per cycle created a cellular substructure whose size was solely dependent on the carbide interparticle spacing. Temperature and strain range effects were noted on the dislocation densities in the matrix which were generally consistent with work reported in the literature. As there were no resolvable changes in the carbides in the ferrite, it was concluded that there must be some change in the microstructure on a finer scale, such as the early stages of Mo-C-Mo cluster formation, which might explain the cyclic hardening/cyclic softening response of the alloy. The fatigue crack growth rate of the alloy was strongly dominated by the hold periods imposed during the loading cycle. A single 0.1 hr. hold period doubled the fatigue crack growth rate obtained for a continuously cycled test and two hold periods per loading cycle gave a four fold increase over the continuously cycled crack growth rate. Although some temperature and strain range effects were noted in the continuously cycled tests, they were totally absent in the hold period tests.

Master of Science in
Mechanical Engineering
June 1981

Advisor: K. D. Challenger
Department of
Mechanical Engineering

DESIGN MODEL FOR THE HEAT TRANSFER
IN A SHORT STRAIGHT TUBE BOILER

Leo W. Vollmer, Jr.
Lieutenant, United States Navy
B.S.E.E., Purdue University, 1974

A design model for the Short Straight Tube Boiler with a segmented fin-tube arrangement was developed. This model was integrated for a single tube and applied in a computer program written in BASIC for the Hewlett Packard 9845 model B desk-top computer.

Water-side Reynolds numbers were varied in order to investigate the performance of this boiler. For an overall tube length of 39.4 inches, a Reynolds number of 840 (29.65 lbm/hr) resulted in obtaining 50° superheat for an operating pressure of 600 psig. With these conditions, saturated boiling begins at 11.45 inches and superheating at 21.88 along the tube length.

Master of Science in
Mechanical Engineering
June 1981

Advisor: P. F. Pucci
Department of
Mechanical Engineering

MASTER OF SCIENCE

IN

METEOROLOGY

TROPICAL STORM MOVEMENT BASED ON SYNOPTIC MAP
TYPING USING EMPIRICAL ORTHOGONAL FUNCTIONS

Danley W. Brown
Major, United States Air Force
B.S., Pennsylvania State University, 1970

This initial study investigates the feasibility of using weather map types to forecast tropical storm/typhoon movement in the Western North Pacific Ocean. Fleet Numerical Oceanographic Center's hemispheric D-value analysis fields at 850, 700 and 500 mb are interpolated to a standard grid oriented relative to the present surface tropical storm position. Empirical Orthogonal Function (EOF) analysis is used to represent the fields in terms of only 10 coefficients in an effort to separate true synoptic map features from random noise. A least squares approach is then applied to determine characteristic synoptic patterns relative to the tropical storm, and to relate each individual case to a "map type". An analog type approach is used to forecast the 30-, 36-, 54-, 60-, 78- and 84-hour positions. All storms determined to be of the same map type as the candidate storm were considered to be analogs, and their storm tracks were rotated to have the same past 12-hour movement. Forecast errors ranged from 135 n.mi. at 30 hours to 490 n.mi. at 84 hours. Although no independent cases were tested, and the techniques employed have not been optimized, the mean vector errors indicate that the basic technique warrants further investigation.

Master of Science in
Meteorology
June 1981

Advisor: R. L. Elsberry
Department of
Meteorology

AN OPEN-OCEAN MARINE FOG DEVELOPMENT AND FORECAST
MODEL FOR OCEAN WEATHER STATION PAPA

Robert Louis Clark
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

Marine fog forecasts during the summer period in the North Pacific are not made presently with any acceptable degree of accuracy. Objective fog development models exist and are used with some success for localized coastal regions of the western U.S.; scarcity of accurate data has hindered creation of a reliable open-ocean model. The Eulerian single-station approach, utilizing a segment of the complete accurate data of Ocean Weather Station Papa (50N,145W) is applied in this study to an objective marine fog forecasting model.

The time-series study of significant atmospheric variables at OWS Papa, when coupled with a chronological synoptic overview, delineates accurately fog/no fog sequences in the summer months of 1973 and 1977. Actual observed fog situations are evaluated by the general model and presented in relation to open-ocean fog indices, NOAA 5 satellite coverage and synoptic history.

The open-ocean forecast model is tested on an independent data set for the month of July 1975 at OWS Papa, with favorable results.

The research delineates four required indices that must all be positive to forecast fog. These indices, when plotted daily in the region of OWS Papa allow a single station to predict, with some confidence out to twenty-four hours, the occurrence of advection fog.

Master of Science in
Meteorology
June 1981

Advisor: G. H. Jung
Department of
Oceanography

SYNOPTIC SCALE FEATURES ASSOCIATED WITH VERTICAL
DISTRIBUTIONS OF IR AEROSOL EXTINCTION

James Norman Heil
Captain, United States Air Force
B.S., University of Texas at El Paso, 1972
M.A., Pepperdine University, 1978

Observed vertical profiles of optical extinction due to aerosol scattering were examined relative to prevailing synoptic scale features. This examination was on the suitability of an existing wind speed and humidity dependent extinction model during different synoptic conditions. The primary synoptic features in question are the depth of the atmospheric well-mixed layer and the nature of the capping inversion. Aerosol extinction profiles were calculated from aerosol size distributions measured from an aircraft in the vicinity of Monterey Bay. Mixed layer descriptions were obtained from temperature and humidity profiles obtained from aircraft spiral ascents and shipboard and shore-line radiosonde launches. The presence of the inversion reduced the accuracies of the current Navy (Wells-Katz) and Air Force (LOWTRAN 3B) models in estimating the extinction profile. The inversion represents a cap to the vertical transport of surface generated aerosols. This is not accounted for in the models. LOWTRAN 3B was found to be inadequate in most respects whereas the Wells-Katz model could be modified to obtain reasonable predictions. Model specification of the continental component was also found to be a significant factor in the comparisons.

Master of Science in
Meteorology
March 1981

Advisor: K. L. Davidson
Department of
Meteorology

A TWO-DIMENSIONAL FINITE ELEMENT ADVECTION
MODEL WITH VARIABLE RESOLUTION

Mark Elwood Older, III
Captain, United States Air Force
B.S., University of Michigan, 1972

Many meteorological forecast applications require the use of grids that have a high resolution in a particular area of interest, while allowing coarser resolution elsewhere. Conventional finite difference models often use nested grids to this end. In recent years, finite element models have been offered as an alternative. In this study, the two dimensional advection equation with diffusion is defined over a rectangular domain. The Galerkin technique is applied to linear basis functions on triangular elements. The model is tested to determine the sensitivity of the forecast to various nodal geometries. Both equilateral and right triangular elements are tested. It is found that the equilateral arrangement consistently yields a superior forecast. Other tests are conducted in which the resolution is varied smoothly versus abruptly over the domain. The smoothly varying case gives results that are dramatically improved over the abruptly varying case. Among the conclusions is the fact that, for a given maximum resolution, the more slowly and smoothly the element size is changed, the better the forecast obtained.

Master of Science in
Meteorology
June 1981

Advisor: R. T. Williams
Department of
Meteorology

DEVELOPMENT OF A PROTOTYPE NORTH PACIFIC OCEAN SURFACE
VISIBILITY CLIMATOLOGY STRATIFIED BY OBSERVATION TIMES

Thomas Norman Talbot
Captain, United States Air Force
B.A., University of Vermont, 1972

This study develops a prototype surface visibility climatology for the North Pacific Ocean. Data, provided by the Naval Oceanographic Command Detachment, Asheville, North Carolina, were extracted from the National Climatic Center's historic files and represent a 20-year (1954-1973) period. The area of study is bounded by latitudes 20°N and 70°N and longitude 120°E and 110°W . Experiments concerning the implementation and modification of and objective processing and analysis routine are briefly described. Select Greenwich Mean Time and Local Standard Time (LST) visibility analyses and their standard deviations for January, April, July and October are developed from a data base of nearly 1.6 million transient ship observations. Each set is analyzed for the diurnal variation of visibility at sea. The LST analyses are found to be unacceptable for use in the investigation of diurnal visibility changes due to an intermediate synoptic time low-visibility bias. Marine fog frequencies from a 10-year period (1967-1976) are shown; they compare favorably with the visibility analyses for comparable time periods.

Master of Science in
Meteorology
June 1981

Advisor: R. J. Renard
Department of
Meteorology

DEVELOPMENT OF IMPROVED FINITE ELEMENT
FORMULATION FOR SHALLOW WATER EQUATIONS

Edward T. Woodward
Captain, United States Air Force
B.A., University of Maine, 1970

The basic principles of the Galerkin finite element method are discussed and applied to two different formulations; one using different basis functions and the other using the vorticity-divergence form of the shallow water equations. Each formulation is compared to the primitive form of the equations developed by Kelley (1976). The testing involves a comparison of three finite element prediction models using variable size elements. Equilateral elements significantly improved the solution and are used in most of the comparisons. The formulation using different basis functions produces poorer results than the primitive formulation. The vorticity-divergence formulation produces superior results while executing faster than the primitive model. However, it does require more storage and the relaxation parameters are sensitive to the domain geometry. The computer implementation for the vorticity-divergence model is discussed and the source listing is included.

Master of Science in
Meteorology
September 1981

Master of Science in
Computer Science
September 1981

Advisors: R. T. Williams
Department of
Meteorology

U. R. Kodres
Department of
Computer Science

MASTER OF SCIENCE

IN

**METEOROLOGY
AND
OCEANOGRAPHY**

LABORATORY STUDY OF SOUND PROPAGATION INTO A FAST BOTTOM MEDIUM

James Arthur Bradshaw
Lieutenant, United States Navy
B.S., Humboldt State College, 1971

An experimental study was performed to determine the feasibility of a laboratory experiment to test an existing theoretical model describing sound propagation into a fast bottom underlying a wedge shaped medium. Sand under fresh water was found to satisfy the constraints of the theoretical model and to simulate the continental shelf. In a laboratory experiment, accuracy of density, sound speeds, and attenuation was shown to be sufficient to allow quantitative comparison to the predictions of the beam angle.

Master of Science in
Meteorology and
Oceanography
June 1981

Advisors: J. V. Sanders
Department of
Physics and Chemistry
R. H. Bourke
Department of
Oceanography

RELATIONSHIPS BETWEEN SYNOPTIC STORM ACTIVITY AND SEA SURFACE
TEMPERATURE ANOMALIES OVER THE NORTH PACIFIC OCEAN

Bauke H. Houtman
Lieutenant, United States Navy
B.S., University of California at Los Angeles, 1975

The significance of year-round relationships between synoptic storm activity and sea-surface temperature (SST) over the North Pacific Ocean for the period January 1969 through December 1978, were examined using cross-correlation analysis. The possible existence of a seasonal dependence in the SST-wind relationships was examined using sub-sample record cross-correlation analysis and model tests with both a constant and a variable mixed-layer depth, respectively. Wind forcing data was represented by (U_{*}^3) , friction velocity cubed, and with stress curl ($CURL_Z\tau$), as computed from: (a) High-pass filtered wind components only (periods less than ten days), (b) High- and Low-pass filtered wind components which includes the interaction terms and (c) the unfiltered (total) wind components.

The correlation maps of SST with both $(U_{*}^3)_H$ and $(U_{*}^3)_H L$, calculated from the ten-year record, showed large areas of significant negative values in the midlatitude North Pacific Ocean when the SST was lagged by any amount from zero- to three-months. Lag correlations involving (U_{*}^3) from (c) and $(CURL_Z\tau)$ were considerably less significant. Zero lag correlations between ΔT SST and the various wind parameters generally substantiated the above results except for revealing a large and significant positive correlation between ΔT SST and the $(CURL_Z\tau)$ (from (c)) off the West Coast of North America.

Master of Science in
Meteorology and
Oceanography
June 1981

Advisor: R. L. Haney
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Meteorology

The sub-sample record examination resulted in generally low significance levels and no statistical confidence as to the existence of a seasonal variation in the relationships. Model tests involving a prescribed, seasonally varying, mixed-layer depth showed that there was no detectable seasonal variation in the SST-wind relationships.

ESTIMATING THE DISTRIBUTION AND PRODUCTION OF MICROPLANKTON
IN A COASTAL UPWELLING FRONT FROM THE CELLULAR CONTENT OF
GUANOSINE-5'-TRIPHOSPHATE AND ADENOSINE-5'-TRIPHOSPHATE

Carol Diane Jori
Lieutenant, United States Navy
B.S., University of Maryland, 1973

This thesis examines the distribution and production of microorganisms within a coastal upwelling front located off Pt. Sur, California. Underway measurements of adenosine-5'-triphosphate (ATP) and pigment fluorescence (principally chlorophyll a) were used to estimate the amount of living biomass present at 2.5 m. Specific and absolute productivity were measured by the nucleotide ratio of guanosine-5'-triphosphate (GTP) to ATP and GTP, respectively. This investigation was conducted to determine the significance and applicability of these productivity indices in studying the relationship of production and distribution of microplankton (principally algae) to frontal features in the coastal upwelling zone. The highest concentration of biomass associated with the highest rate of absolute productivity was preferentially located in the strong thermonutrient gradient in the warmer stratified water at the equatorward edge of the feature.

The measurement of specific productivity using the GTP to ATP ratio was significantly correlated with assimilation numbers (productivity index), lending support to the hypothesis that this ratio is a good indicator of specific community productivity in microplankton (principally phytoplankton).

No correlation existed between the GTP concentration which was enzymatically determined, and the concentration of GTP which was inferred from the calculated values of Δ ATP is not a good estimator of GTP in community assemblages of microplankton.

Master of Science in
Meteorology and
Oceanography
September 1981

Advisor: E. D. Traganza
Department of
Oceanography

SCANNING ELECTRON MICROSCOPE OBSERVATIONS OF MARINE MICROORGANISMS
ON SURFACES COATED WITH ANTIFOULING PAINTS

Patrick R. Kelly
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

Scanning electron microscopy was used to observe microbiological primary fouling of glass slides and slides coated with U.S. Navy antifouling paints exposed in Monterey harbor. Four paints were tested, three of which contained copper or tin as their toxic ingredient and one which used a chlorinated pesticide, an organic compound, as the antifouling ingredient. Samples removed at regular intervals, of days up to several weeks, showed that bacterial slimes populated the glass and heavy-metal based paints early and in great numbers throughout the study, but the surfaces painted with the organic compound toxicant were free of all microfouling organisms. A succession of periphytic microorganisms was observed on glass and the heavy-metal based painted surfaces which began with bacteria followed by diatoms and later by protozoans.

Master of Science in
Meteorology and
Oceanography
June 1981

Advisor: E. Haderlie
Department of
Oceanography

BIOLOGICAL PATCHINESS IN RELATION TO SATELLITE THERMAL
IMAGERY AND ASSOCIATED CHEMICAL MESOSCALE FEATURES

Ronald Wayne Phoebus
Commander, United States Navy
B.S., United States Merchant Marine Academy, 1967

The presence of biological patches, or communities, can have a direct effect on Naval operations, scientific research, and fisheries. It is shown that remote infrared satellite sensing may be used as a real-time tool to accurately locate thermally and biologically significant features. Several physical, chemical, and biological variables were sampled in the surface layer of mesoscale thermal features which were located using satellite imagery. The bio-chemical sampling produced replicate results from which the distribution of biomass could be inferred. Possible explanations are advanced for patch forming mechanisms and biomass distribution.

Master of Science in
Meteorology and
Oceanography
June 1981

Advisor: E. D. Traganza
Department of
Oceanography

APPLICATION OF QUASI-LAGRANGIAN DIAGNOSTICS AND
FGGE DATA IN A STUDY OF EAST-COAST CYCLOGENESIS

Donald A. Roman
Lieutenant Commander, United States Navy
B.S., State University of New York, Maritime College
at Fort Schuyler, 1970

This synoptic study of an explosive deepening event, the Presidents' Day Storm of 17-20 February 1979, introduces and examines the Level III-b FGGE data in an oceanic storm. It applies the quantitative quasi-Lagrangian diagnostics techniques to both the FGGE data for a 48-hour period and a 24-hour LFM II prediction.

Using a mass budget analysis in isobaric coordinates, the mass structure and circulation intensity are examined and intercomparisons between the FGGE observed cyclone and the LFM model predictions are made. Destabilization that is found during cyclogenesis is a maximum during the early time periods. The LFM fields did not develop the intensity, strength, or depth of circulation that is found in the observed FGGE data. This may be linked to a poor representation of the diabatic processes in the LFM model.

Master of Science in
Meteorology and
Oceanography
September 1981

Advisor: C. H. Wash
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Meteorology

METEOROLOGICAL FACTORS IN HIGH RESOLUTION SATELLITE IMAGERY (DMSP)

Mark Evans Schultz
Lieutenant, United States Navy
B.S., University of Washington, 1974

Comparisons of the predicted aerosol size distributions from the Shettle and Fenn, the Munn-Katz, and the Hybrid models are made with aerosol size distribution data sets collected off the California coast near Monterey in April and May, 1980. It is shown that the mixing volume (inversion height) is an important parameter in predictive aerosol distribution equations. The Hybrid model is determined to be inaccurate when compared with the Shettle and Fenn and the Munn-Katz models. The Shettle and Fenn model consistently provided the most accurate results. However, it requires an input of either total particle concentration or visibility, neither of which are easily measured or predicted. The Munn-Katz model is determined to be the most operationally useful of the three models studied. It depends only on the bulk meteorological parameters of wind speed, relative humidity and altitude. The Munn-Katz model neglects mixing volume and advection. The observed data further suggest that an aerosol model which does not include a continental distribution may be more appropriate for the open ocean environment.

Master of Science in
Meteorology and
Oceanography
June 1981

Advisor: K. L. Davidson
Department of
Meteorology

DATA ASSIMILATION IN A ONE-DIMENSIONAL
OCEANIC MIXED LAYER MODEL

Larry Lee Warrenfeltz
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

Requirements for an operational oceanic mixed layer model are discussed. Data assimilation comparisons in oceanic modeling studies and in numerical weather prediction are made. A method for assimilating data in one-dimensional oceanic models is described. The Garwood One-Dimensional Oceanic Planetary Boundary Layer Model was modified for insertion of temperature profiles during model integration. The sensitivity of the model to insertions of erroneous temperature data is tested. Insertions of erroneous temperature data is tested. Insertions were made in winter, summer, and during the spring transition.

The hypothesis was formulated that forecasts made by the Garwood model could be improved by using all available past temperature information. Simulated temperature "history" profiles were created for 14 years between 1953 and 1969. The experiments showed improvement in the 15-day forecasts when 5, 15, or 30 history profiles were included in the initialization of the model. A gross-error check to eliminate erroneous profiles further increased forecast accuracy.

Master of Science in
Meteorology and
Oceanography
December 1980

Advisor: R. L. Elsberry
Department of
Meteorology

MASTER OF SCIENCE

IN

OCEANOGRAPHY

ECOLOGY AND DISTRIBUTION OF THE BENTHIC COMMUNITY
ON THE MONTEREY BREAKWATER
MONTEREY, CALIFORNIA

Steven J. Busch
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

An ecological baseline study was conducted on the Monterey breakwater. Qualitative and quantitative survey of the plants and animals occupying meter square quadrats along a cross-sectional transect covering the breakwater and the adjacent mud bottom out to depths of 13 meters was made. Overall, the differences between the populations of the inner and outer parts of the breakwater appeared minor and primarily involved differences in relative abundance of only a few species. Data from this study establish an ecological baseline for future studies on the Monterey breakwater.

Master of Science in
Oceanography
March 1981

Advisor: E. C. Haderlie
Department of
Oceanography

ANALYSIS AND SIMULATION OF WIND-DRIVEN CURRENTS

Jose M. Fernandez Lopez
Lieutenant Commander, Spanish Navy

The wind stress calculated from wind velocities measured during the Mixed Layer Experiment (MILE) was used as input to a one-dimensional wind-driven current model. These model results are compared with observed currents from the MILE-1 buoy, showing a qualitative agreement.

MILE was an examination of the upper ocean carried out near Ocean Weather Station Papa during a 20-day period, August and September of 1977, which was characterized by two major wind events.

The observed currents have been analyzed to obtain information about their behavior that could be used in the tuning of the model. For a simulation of the entire period, the results are considered only satisfactory.

Master of Science in
Oceanography
March 1981

Advisor: R. W. Garwood
Department of
Oceanography

ACOUSTIC PROPAGATION IN THE SOMALI BASIN

James Samuel Hanna
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

Acoustic propagation in the Somali Basin region of the Indian Ocean was evaluated using the ICAPS program. Direct path range predictions were made for a towed array (100 Hz) at 100 m and a hull mounted sonar (2000 Hz) at 10 m sensing a signal generated by a source at 100 m. Predictions were based on climatological and recent observed data. These predictions were compared in order to ascertain the accuracy of the ICAPS climatological prediction. In general, the ICAPS performed marginally well during the summer monsoon season with an average difference of 9% in predicted ranges at 100 Hz and 19% at 2000 Hz for a FOM of 100 or greater. However, predictions based on the winter season climatology were significantly in error with range predictions being over and under predicted by a factor of two.

Master of Science in
Oceanography
December 1980

Advisor: R. H. Bourke
Department of
Oceanography

THE ECOLOGY OF THE BENTHIC AND ENDOLITHIC COMMUNITIES OF A ROCKY REEF IN THE KELP BEDS OFF DEL MONTE BEACH, MONTEREY, CALIFORNIA

Richard Gurney Hoffman, Jr.
Lieutenant, United States Navy
B.S., The Citadel, 1975

Divers, using SCUBA equipment, conducted an ecological survey along two transects on a large reef-like feature in the exposed shale off Del Monte Beach. A population census and notes concerning the relative location of the various organisms, including the identification of 248 species, is presented. The vertical variations of the populations of bivalve borers and associated benthic and endolithic organisms was investigated. The major environmental factors controlling the populations in this area were seen to be the level of siltation and the hardness of the rock. The large bivalve borers (Chaceia ovoidea and Parapholas californica) occupy different regions of the ledge. Chaceia was found in the vertical regions away from silt deposition and Parapholas was found in the horizontal regions, often under several centimeters of sand. Other possible boring organisms were identified. The sipunculid Themiste pyroides was found in burrows that are quite different from the typical bivalve burrow. The annelid Palola paloloides was found in burrows of apparently its own manufacture. A number of nestling organisms were found. The annelid nestlers found in this region show a large variation across the vertical face that was a result of the different siltation regimes.

Master of Science in
Oceanography
June 1981

Advisor: E. C. Haderlie
Department of
Oceanography

ERROR ANALYSIS OF HYDROGRAPHIC POSITIONING
AND THE APPLICATION OF LEAST SQUARES

Ali Kaplan
Lieutenant, Turkish Navy
Turkish Naval Academy, 1974

Repeatable accuracy of hydrographic positioning was examined in the terms of the two-dimensional normal distribution function which results in an elliptical error figure. The error ellipse was discussed, and two methods for conversion of elliptical errors to circular errors were given. These methods are "circle of equivalent probability" and "root mean square error" (d_{rms}). Using the d_{rms} error concept, repeatable accuracy of ranging, azimuthal, and hyperbolic systems was evaluated, and methods were developed to draw repeatability contours for those systems.

A brief theory background was provided to explain the method of least squares and discuss its application to hydrographic survey positioning. For ranging, hyperbolic, azimuthal, sextant angle, and Global Positioning System the least squares observation equations were developed. Specific examples were constructed to demonstrate the capabilities of this data adjustment technique when applied to redundant position observations.

Master of Science in
Oceanography (Hydrography)
September 1980

Advisor: D. Leath
Department of
Oceanography

TEST OF THE APPLICATION OF THE TYWAVES MODEL TO PREDICTION OF SWELL IN THE
EAST CHINA SEA FROM THREE TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC

Hyong Sun Lee
Lieutenant Commander, Republic of Korea Navy
B.S., Republic of Korea Naval Academy, 1972

A method for predicting swell from tropical cyclones using a spectral wave model (TYWAVES) was tested. The model was applied to predicting swell propagating from three typhoons in the Western North Pacific through gaps in the Ryukyu Islands into a region of the East China Sea. The model involves a source region concept which considers only the swell emanating from regions of peak energy in moving typhoons. For three representative typhoons, predicted heights were not significantly different from the observed heights. The time of occurrence of the predicted peak height agreed well with the observational values for the swell from two typhoons, but lagged by 6-12 hours for the third.

The dominant swell period and direction predicted by the model were not verifiable by data available for this study.

Shoaling and refraction effects were considered in the prediction, in a simplified way, but attenuation was ignored even for the passage of energy through the Ryukyu Islands.

Master of Science in
Oceanography
December 1980

Advisor: J. B. Wickham
Department of
Oceanography

OCEAN THERMAL ANALYSIS AND RELATED NAVAL OPERATIONAL
CONSIDERATIONS IN THE IONIAN SEA - JUNE 1980

Laurent Monsaingeon
Lieutenant de Vaisseau, French Navy

A synoptic analysis of the Ionian Sea in June 1980 showed thermal patterns of various scale sizes, and in particular, a warm core eddy which was comparable in size (ca. 30 km) and location with one found in MILOC-68. Spatial correlation functions of temperature were anisotropic in the southern part, with zero-crossings of 30 km in the EW direction and 40 to 80 km in the NS direction, commensurate with the (first mode) baroclinic Rossby radius of deformation of 23 km. There was a shallow main sound channel (axis at ca. 100m) and some secondary sound channels caused by temperature inversions. The spatial patterns of these sound channels were associated with synoptic scale and mesoscale oceanic phenomena, which in turn were influenced by bathymetry. The temporal patterns were influenced by atmospheric forcing. It may be possible to use features seen in satellite IR imagery to deduce zones with shoaler thermocline depth. With data sampling appropriate to the scales of atmospheric and oceanic variability, a valuable synoptic scale analysis can be derived from XBTs collected under operational conditions. Recommendations for a regional approach to military oceanography and XBT sampling procedures are made.

Master of Science in
Oceanography
September 1981

Advisors: C. N. K. Mooers
R. H. Bourke
Department of
Oceanography

APPLICATION OF THE GLOBAL POSITIONING SYSTEM
TO NEARSHORE HYDROGRAPHIC SURVEYS

Virginia Elisabeth Newell
Lieutenant, NOAA
B.A., University of Maine, 1971
M.S., Virginia Polytechnic Institute and State University, 1975

and

Donald Dane Winter
Lieutenant Commander, NOAA
B.S., University of Michigan, 1973

Translocation of the Global Positioning System has proved to be a highly accurate method of position determination for onshore and airborne navigation, but it had not been previously evaluated for nearshore hydrographic surveys. The technique of translocation for hydrographic operations involves the simultaneous reception of signals from the GPS satellites by two independent receivers; one receiver onboard the survey vessel and one located at the known stationary position. A position correction is obtained at the stationary receiver, which is then applied to the shipboard receiver online or during postprocessing. An accuracy determination of translocated GPS was conducted at the Naval Postgraduate School, Monterey, CA, May 1981. Two methods of positioning were used for comparison with GPS: 1) a least squares solution of three lines of position observed from three Wild T-2 theodolites, and 2) a position determined from ARTEMIS, a range-azimuth short range microwave positioning system. Translocated GPS accuracies of 10 meters were determined. It is anticipated that greater accuracies will be obtained by using a more sophisticated receiver and more advanced processing methods.

Master of Science in
Oceanography/Hydrography
September 1981

Advisors: R. W. Garwood
J. J. Von Schwind
Department of
Oceanography

TRANSFORMATION OF WAVES ACROSS THE SURF ZONE

Galo Padilla Teran
Lieutenant, Ecuadorean Navy
Ecuadorean Naval Academy, 1970

Goda's (1975) model, describing wave transformation from deep water to across the surf zone, is compared with a large amount of wave data obtained from experiments conducted at Torrey Pines Beach, San Diego, California. Goda's model simulates wave breaking by truncating the Rayleigh Distribution in order to estimate the wave height distributions across the surf zone; wave heights are shoaled by applying nonlinear theory. Comparisons between the empirical distributions and theoretical distributions and between measured and theoretical rms wave heights are made. It is found that Goda's model over-predicts the tails and under-predicts the peaks of the empirical distributions and that the calculated rms wave heights are too large compared with measured values.

The range of breaking and the coefficients used in the breaking criteria by Goda are modified in order to obtain a model which better fits the distribution of observed heights, and which matches the model and observed rms wave heights. The results are quite good with error envelope for predicted rms wave heights less than 20%. Linear shoaling theory is applied to the model and found to be as good as applying nonlinear theory.

Master of Science in
Oceanography
March 1981

Advisor: E. B. Thornton
Department of
Oceanography

SEA LEVELS VARIATION IN GULF OF THAILAND

Vichai Punpuk
LTJG, Royal Thai Navy
B.S., Royal Thai Navy Academy, 1974

From a study of low-pass filtered hourly sea levels for Sattahip and Ko-Lak in the northern Gulf of Thailand during the period 1960 through 1966, the sea level variations due to meteorological effects are found. The mean annual variation of the filtered sea level, which averages 0.5 meters, is consistent with the climatological mean annual wind variations. This sea level change appears to be a response to the Ekman transport which would be expected from the seasonal monsoon wind regimes. Sea level response to atmospheric pressure is negligible compared with response to wind. Analyses performed to find relations between the filtered sea level and the gulf-wide geostrophic wind and local surface wind show that the sea level slopes upward across the gulf in the same direction as the local wind blows, the response being coherent in the frequency band 0.083-0.117 cycles per day (period 8 to 12 days). This wind set-up effect is clearly secondary to the Ekman transport in inducing the seasonal sea level variations observed in the gulf.

Master of Science in
Oceanography
March 1981

Advisors: J. B. Wickham
W. C. Thompson
Department of
Oceanography

A SENSITIVITY STUDY OF THE PARABOLIC EQUATION MODEL
TO BOTTOM TYPE AND GEOMETRY

Antonio Ruiz Cañavate
Lieutenant, Spanish Navy

The effect of several types of flat and sloping bottom configurations and bottom geophysical properties are studied using the parabolic equation model in a sensitivity analysis to determine the importance of such environmental parameters. Low frequency and fixed source and receiver depths have been used along with a single sound speed profile, in both deep and shallow water cases. For a fully absorbing bottom, only the refracted energy paths remain, making the model insensitive to the bottom geometry. For a perfectly reflecting bottom, both the refracted and the reflected paths were present in deep water tests, and only the reflected paths in shallow water cases. For the sloping bottom geometries a periodic interference pattern was found in transmission loss, with a wavelength inversely related to the bottom slope. A more realistic partially-absorbing bottom proved to have properties very similar to those of the perfectly reflecting bottom.

Master of Science in
Oceanography
March 1981

Advisors: R. H. Bourke
R. W. Garwood
Department of
Oceanography

ORGANIZATION OF AN OCEANOGRAPHIC DATA BANK FOR THE PERUVIAN NAVY

Hector Soldi Soldi
Lieutenant, Peruvian Navy
B.A., Peruvian Naval Academy, 1973

Oceanographic data have been acquired along the coast of Peru for several decades. This information is important due to the effect of the cold northward Peru Current and Undercurrent and the intermittent warm "El Nino" countercurrent along the coast of Peru. These two phenomena greatly affect the fishing grounds along the coast as well as the characteristics of sound propagation in the sea due to changes in the vertical thermal structure of the water column. The creation of an oceanographic data bank for the Peruvian Navy is proposed for the archival from various sources of all available historical data for the waters near Peru. The data bank will be updated by a long term program of oceanographic data acquisition and exchange with local and foreign institutions. These data will be stored in an easily accessible format that can be useful for the Navy in creating operational products for the fleet and in monitoring and eventually predicting the ocean variability along the coast of Peru.

Some of the applications of the data bank for the Navy, fisheries and other potential users are presented.

Master of Science in
Oceanography
September 1981

Advisor: R. W. Garwood
Department of
Oceanography

MASTER OF SCIENCE

IN

OPERATIONS RESEARCH

INVESTIGATION OF ALTERNATIVE METHODS INCLUDING JACKKNIFING
FOR ESTIMATING POINT AVAILABILITY OF A SYSTEM

Barbaros Aba
Lieutenant, Turkish Navy
B.S., U.S. Naval Postgraduate School, 1981

Properties of two alternative procedures to the Jackknife Point and Confidence Interval Estimation Procedure of Gaver and Chu have been studied. They are called the Log-Normal Likelihood Procedure (LNLP) and the Moment Procedure (MP). These two procedures were investigated and compared with the Jackknife Point and Confidence Interval Availability Estimation Procedure. Numerical results from simulations are presented in this report.

Master of Science in
Operations Research
September 1981

Advisor: D. P. Gaver
Department of
Operations Research

DISCUSSION AND RE-ANALYSIS OF EXPERIMENTAL DATA IN
THE INVESTIGATION OF ULTRADIAN RHYTHMS IN HUMANS

Torsten Andresen
Kapitaenleutnant, Federal German Navy

In this paper a discussion and re-analysis of experimental data is carried out. The data consist of measurements of the performance on two tasks (verbal and spatial) that are performed by the two different brain halves. The original experiments and analysis had been conducted by R. Klein and R. Armitage in the investigation of ultradian rhythms in humans. The period of the ultradian cycle had been hypothetically equated to the period REM-sleep occurrence. In the re-analysis, previously unmentioned inhomogeneity was discovered and the findings by the original experimenter-analysts could not be confirmed at the stated significance levels. A discussion of and recommendations for the experimental set-up are included. The re-analysis was conducted with *non-parametric methods*. Small ultradian rhythmicity was concluded to have been inducted by influence of circadia rhythm, experimental set-up and inhomogeneity among subjects.

Master of Science in
Operations Research
March 1981

Advisors: D. E. Neil
P. A. W. Lewis
Department of
Operations Research

CONCEPTS OF COMBAT MODELLING FOR LONG-RANGE AIR ARMAMENT PLANNING
AND THEIR IMPLEMENTATION IN THE "TACTICAL AIR WAR ANALYSIS GAME"

Otfried Hartmut Bapistella
Major, Federal Republic of Germany, Air Force
Ing. (Grad.), Fachhochschule der Luftwaffe, Muenchen, 1972

This thesis describes the conceptual background and the main problems encountered in force-structure planning. The model structure of the "Tactical Air War Analysis Game" (TAWAG) is reviewed and improvements and enrichments are proposed. Based on experience from trying to implement this model on the computer of the Naval Postgraduate School, the author makes some recommendations to improve the transferability of models.

Master of Science in
Operations Research
September 1981

Advisor: J. G. Taylor
Department of
Operations Research

THE ONE-SAMPLE K-S TEST: TI-59 PROGRAMS FOR
DISCRETE AND CONTINUOUS RANDOM VARIABLES

Douglas Warren Brown
Lieutenant, Supply Corps, United States Navy
A.B., Whitman College, 1974

The Kolmogorov-Smirnov (K-S) goodness-of-fit test is a nonparametric test if the random variable is continuous. If the random variable is discrete, the K-S test is not nonparametric.

Two programs for the TI-59 programmable calculator are presented, "Continuous K-S" and "Discrete K-S." They are designed to conduct a K-S test and display the significance level. User instructions and several sample problems are presented.

Use of the "hidden registers" in the TI-59 is discussed. The hidden registers are used extensively in the program Discrete K-S.

Master of Science in
Operations Research
March 1981

Advisor: D. R. Barr
Department of
Operations Research

IVONNE: AN INTERACTIVE NETWORK MODEL-BUILDING SYSTEM

Charles Stephen Burchinal
Captain, United States Marine Corps
B.A., Otterbein College, 1975

Fast and efficient mathematical programming routines have been developed for network flow problems, but due to their complexity the average manager or lay analyst does not possess the mathematical or programming background required to construct the models or use the solution technology available. This problem is solved here by the development of an interactive network generating system designed to create, update, and solve a single-commodity network with only a minimal knowledge of network structure and only a rudimentary mastery of computer terminal use. This is accomplished through the interactive use of a set of FORTRAN programs which lead the user, step-by-step, through the construction of the network by series of queries, and which links with GNET, a machine independent FORTRAN program for the solution of capacitated network flow problems.

Master of Science in
Operations Research
September 1981

Advisor: G. G. Brown
Department of
Operations Research

STAR - COPPERHEAD INTERFACE

Thomas Everett Cahill
Captain, United States Army
United States Military Academy, 1972

This thesis provides the general design logic for a computer representation of the Field Artillery's precision guided munition - Copperhead. The design has been specifically structured to enable its integration into the Simulation of Tactical Alternative Responses (STAR) Model. (STAR is a stochastic force-on-force combat simulation.) Routines and events are developed which portray the target identification, target selection, firing, and impact phases of the Copperhead system. Interface points of the new logic with the current STAR model are identified and the modifications required to support the new system are discussed. Also presented is an overview of STAR's current Field Artillery module. Key Copperhead system characteristics which influence the model are also described.

Master of Science in
Operations Research
March 1981

Advisor: A. L. Schoenstadt
Department of
Mathematics

A DESCRIPTIVE ANALYSIS OF FIRST TERM ATTRITION FROM U.S. NAVAL SHIPS

Carl Glynn Carlson
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

This thesis was conducted to analyze certain factors effecting first-term attrition from U.S. Naval ships. The Survival Tracking File (STF) was used as the primary data source, and from it files were constructed that permitted three areas of study. First, the overall cohort of a year's worth of first term enlistees was examined. The survival curve for the cohort was generated and individual monthly cohorts were examined for attrition patterns. Secondly, overall attrition percentages were calculated for individual ships and for classes of ships and these attrition percentages were then examined for differences using statistical techniques. An ANOVA model using transformed data proved accurate in explaining attrition variance. Lastly, a comparison between attrition per month and underway hours per month was made for classes of ships and for individual ships of three specific classes. A rough relationship was observed, for certain classes of ships, between peaks of high underway hours and peaks of attrition. In looking at individual aircraft carriers, the attrition percentage seemed to be inversely proportional to underway hours per month. Several of these findings warrant further investigation so that the Navy may more fully understand its attrition problem and thereby take steps to alleviate it.

Master of Science in
Operations Research
September 1981

Advisor: R. S. Elster
Department of
Administrative Sciences

THE MULTI-CUSTOMER LOCAL DELIVERY PROBLEM
AND THE SITING OF REPAIR PARTS INVENTORIES

Thomas R. Chambers
Lieutenant Commander, United States Navy
B.A., University of California, San Diego, 1970

A local delivery model was developed for a repair facility-stock point system, given one or more supported production and each component repaired may require more than one part. Both deterministic and random demands were considered. The objective function was total expected transportation and delay costs per day. In the deterministic case the total cost curve was discontinuous and the optimal delivery policy could only be determined by exhaustive enumeration. A computer simulation model was needed for the random demand case. The simulation model was also extended to allow random issue processing time and a remote warehouse sited close to the repair facility. The results of the simulation showed that point of entry effectiveness and non-local response times were key factors of expected delay costs and that these costs could be reduced through the use of a remote warehouse. More importantly, providing the best support to customers requiring the fewest parts per component repaired will give the minimum expected delay cost.

Master of Science in
Operations Research
September 1981

Advisor: A. W. McMasters
Department of
Operations Research

VEHICLE ROUTING ALGORITHMS FOR LOCAL DELIVERY
AT NAVAL SUPPLY CENTERS

Clifford O. Clausen
Captain, United States Army
B.S., United States Military Academy, 1974

This thesis examines the local delivery operations at the Naval Supply Centers in Oakland and San Diego. The local delivery problem is formulated as a model applicable to these supply centers. Specifically, the model involves routing a fleet of vehicles from a central depot to each of a set of customers so as to satisfy their demands. Twelve heuristic solution methods applicable to this model are reviewed and illustrated with examples. They are also compared with respect to quality of resulting solutions and computational efficiency. Finally, recommendations on improving the routing of vehicles at the two Naval Supply Centers are made.

Master of Science in
Operations Research
March 1981

Advisor: A. W. McMasters
Department of
Operations Research

A MAXIMUM LIKELIHOOD TRACKER

Robert D. Conrad
Lieutenant, United States Navy
B.S., United States Military Academy, 1975

This report deals with the development and utilization of a maximum likelihood tracking algorithm designed to handle a single diffusing target. The tracker is required to accept or reject each of a sequence of discrete position reports, some of which are false alarms. Average tracking time, $E(T)$, is defined and used to evaluate tracker performance. The effects of tracker memory are examined and a Kalman filter is developed to handle the effects of measurement error. Simulation results are included.

Master of Science in
Operations Research
March 1981

Advisor: A. Washburn
Department of
Operations Research

A PARAMETRIC ANALYSIS OF THREE MODELS FOR
DIRECT DELIVERY BY A NAVAL SUPPLY CENTER
TO A NAVAL AIR REWORK FACILITY

Mary Ellen Davidson
Lieutenant, Supply Corps, United States Navy
B.A., University of Tulsa, 1969

This thesis provides a parametric analysis of three models for direct delivery by a Naval Supply Center (NSC) to a Naval Air Rework Facility (NARF). The models include both scheduled and unscheduled deliveries. Parameters which were studied included the ratio of delay cost to delivery cost and the probability of a repair part being demanded by a component undergoing repair. The decision variables were the time between deliveries for scheduled deliveries and the number of units of an item delivered for unscheduled deliveries. The impact on the decision variables of varying the parameters was the major focus of the analysis. The results of the analysis suggest that scheduled delivery is a good direct delivery strategy for an NSC to use in supporting a NARF. However, the analysis has shown that the expected total cost for all three alternatives is very close. Therefore, the final criterion for which alternative should be chosen is essentially ease of usage and implementation.

Master of Science in
Operations Research
March 1981

Advisor: A. W. McMasters
Department of
Operations Research

A STATISTICAL ANALYSIS OF MONTHLY RAINFALL FOR
MONTEREY PENINSULA AND THE CARMEL VALLEY
IN CENTRAL CALIFORNIA

David Frederick Davis
Captain, United States Army
B.S., Colorado School of Mines, 1972

This thesis presents a statistical analysis of the monthly rainfall for the Monterey Peninsula and the Carmel Valley in Central California. The analysis begins with the simple first-order autoregressive Markov model which is found to be weak. Next, 2x2 contingency tables are used to identify predictors, one of which is found to be January rainfall. Finally, logistic analysis is used to quantify the predictive ability of January.

This paper attempts to analyze rainfall time series in the statistical sense. No attempt is made to provide a physical explanation of the findings from the point of view of a meteorologist.

Master of Science in
Operations Research
March 1981

Advisor: P. A. Jacobs
Department of
Operations Research

COMPUTATIONAL ADVANCES IN LARGE-SCALE NONLINEAR OPTIMIZATION

Dennis Ross Dean
Lieutenant Commander, United States Navy
B.S., Purdue University, 1972

This is a comparison of two state-of-the art large-scale nonlinear optimization systems exhibiting unprecedented problem solution capabilities both in size of problem handled and method of solution. These codes are MINOS, developed by B. A. Murtagh and M. A. Saunders, and XS, developed by G. G. Brown and G. W. Graves. The codes are evaluated with respect to their problem solving capabilities and potential for practical application by analysts. Computational results are presented for thirteen nonlinear and nonlinear mixed integer test problems with from two to 793 variables (12 to 100 integer variables) and one to 401 constraints.

Master of Science in
Operations Research
September 1981

Advisor: G. G. Brown
Department of
Operations Research

A MICROCOMPUTER-BASED NETWORK OPTIMIZATION PACKAGE

Richard Henry Duff
Major, United States Marine Corps
B.S., Drexel Institute of Technology, 1968

An important branch of mathematical programming is concerned with optimization in systems described by networks. This paper describes an integrated suite of advanced techniques for dealing with minimum cost network flow formulations. Written in Pascal and implemented on a microcomputer representative of current small computer technology (the APPLE II), this package places unprecedented modeling versatility and solution capability on the analyst's desktop. Able to solve small to medium size problems (300 arcs or less) at reasonable speeds, programs to handle capacitated linear, nonlinear (convex separable), mixed integer and elastic ranged linear models in addition to comprehensive control and data management routines are included. Problem size and solution speed benchmarks are given for a variety of models.

Master of Science in
Operations Research
September 1981

Advisor: G. G. Brown
Department of
Operations Research

A METHODOLOGY TO FIND OVERALL SYSTEM EFFECTIVENESS IN A
MULTICRITERION ENVIRONMENT USING SURFACE TO AIR MISSILE
WEAPON SYSTEMS AS AN EXAMPLE

Knut O. Flaathen
Lieutenant Commander, Royal Norwegian Navy
Graduate, Royal Norwegian Naval Academy, 1970

Finding overall system effectiveness from a multicriterion environment using SAM weapon systems as an example, is the purpose of this thesis. SAM weapon systems were rated by four groups of experienced individuals, and judged overall system effectiveness for each system was calculated using the Constant Sum Scaling Method. Multiple regression analysis was then used to establish a functional relationship between overall system effectiveness and weapon characteristics (including missile price). It was concluded that there were no significant differences among the judged results in the four groups, nor between judged and functional overall system effectiveness.

Master of Science in
Operations Research
September 1981

Advisor: G. F. Lindsay
Department of
Operations Research

QUALITY CONTROL WITHIN THE NAVAL SUPPLY SYSTEM

John Edward Flanagan, Jr.
Lieutenant Commander, United States Navy
B.S., Iowa State University, 1972

The implementation of a Naval Supply Systems Command Quality Control Program is intended to promote improved performance at U.S. Naval stockpoints. This paper examines current quality control procedures, compares current practice to quality control theory, and recommends that sequential sampling techniques be adopted. Sequential sampling plans and their associated operating characteristic curves and average sample number curves are provided. Implementation of the recommended procedures would result in a more flexible and efficient Quality Control Program at Naval Supply System stockpoints.

Master of Science in
Operations Research
March 1981

Advisor: C. F. Taylor
Department of
Operations Research

AN EVALUATION OF ESTIMATORS FOR RECEIVER DETECTION
PROBABILITIES AND UNKNOWN SIGNAL POPULATION SIZE

David Scott Hendrickx
Captain, United States Army
B.S., Clarkson College of Technology, 1974

Imagine a signal acquisition system composed of a number of receivers or sensors concurrently scanning the same domain for signals. It is reasonable to expect that different signals will each be detected by a different subset of receivers over the scanning period. Using the data collected from the receivers, it is possible to estimate the total signal population size including those signals not detected by any receiver. Additionally, it is possible to estimate the probability each individual receiver detects signals. Several estimators are developed for these quantities in the context of a model designed to represent the signal detection process. This model forms the basis for a simulation conducted to analyze the behavior of the estimators over a variety of conditions.

Master of Science in
Operations Research
September 1981

Advisor: D. R. Barr
Department of
Operations Research

STATISTICAL ANALYSIS SOFTWARE FOR THE TRS-80 MICROCOMPUTER

Robert Paul Isbell
Major, United States Marine Corps
B.S., United States Naval Academy, 1967

This paper documents the development of a statistical analysis package for the TRS-80 microcomputer. The package is comprised of six interactive programs which are generally divided into topical areas. The major emphasis is on exploratory data analysis and statistical inference, however, probability and inverse probability distributions are also included.

The programming language is TRS-80 Level II BASIC enhanced by the input/output commands available through the ESF-80 (Exatron Stringy Floppy) mass storage subsystem. With the modification of these few commands, the package is compatible with most floppy disk operating systems designed for the TRS-80 Model I or Model III microcomputers.

This statistical analysis capability implemented on a relatively inexpensive system provides a useful tool to the student or the trained analyst without ready access to a mainframe computer system.

Master of Science in
Operations Research
September 1981

Advisor: C. F. Taylor
Department of
Operations Research

AN EVALUATION OF THE EFFECTIVENESS OF COLOR CODED
TACTICAL SYMBOLOGY APPLIED TO MILITARY MAPS

Peter Kafurke
Captain, Federal German Army
Betriebswirt (Grad.), FHS Darmstadt, 1974

This thesis examined the effect of using color coded tactical symbology on military maps. It reviewed the basic aspects of color coding techniques and described a task paced experiment in which conventional monochrome (blue vs. red) coding techniques were compared to multiple color coding. The multicolor coded stimuli used were 5 standard symbols representing Artillery, Armor, Infantry, Mechanized Infantry and Engineers. The symbols were coded red, green, blue, orange and black respectively. The analysis of the data obtained from 20 subjects revealed that performance under multicolor coding condition was significantly superior with respect to response time, accuracy of response and accuracy of location transfer onto a copy of the displayed map.

Master of Science in
Operations Research
September 1981

Advisors: W. F. Moroney
D. E. Neil
Department of
Operations Research

A MODEL OF ORGANIZATIONAL DECISION PROCESSES

Woo Youl Kim
Lieutenant Colonel, Korean Army
B.S., Korean Military Academy, 1967

The generalized goal decomposition model proposed by Ruefli as a single period decision model is presented for the purpose of a review and extended to make a multiple period planning model. The multiple period planning model in the three level organization is formulated with linear goal deviations by introducing the goal programming method. Dynamic formulation using the generalized goal decomposition model for each single period problem is also presented. An iterative search algorithm is presented as an appropriate solution method of the dynamic formulation of the multiple period planning model.

Master of Science in
Operations Research
March 1981

Advisor: D. C. Boger
Department of
Administrative Sciences

A STATISTICAL ANALYSIS OF DAILY AND WEEKLY RAINFALL FOR
THE MONTEREY PENINSULA, IN CENTRAL CALIFORNIA

Davut Kirca
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1981

This thesis presents a preliminary statistical analysis of the daily and weekly rainfall for the Monterey Peninsula, in central California. The analysis begins by examining the daily rainfall data, also the relationship among the length of the storms, amount of rainfall in the storms and length of the successive days of rain. Also included is a study of the distribution of the amount of rainfall in the storms. Also study of the distribution was carried out for non-zero weekly rainfalls. 4x4 contingency tables are used to identify dependence/independence among the weeks in a given month. Also, 2x2 contingency tables are used to examine dependencies between weekly rainfalls; logistic analysis is used as a *parametric model for dependence*.

This paper attempts to analyze rainfall data in the statistical sense. No attempt is made to provide a physical explanation of the findings from the point of view of a meteorologist.

Master of Science in
Operations Research
September 1981

Advisor: D. P. Gaver
Department of
Operations Research

A PROPOSED FLIGHT SAFETY PROGRAM
FOR THE KOREAN AIR FORCE

Chong Kwan Lee
Major, Republic of Korea Air Force
Graduate of Korean Air Force Academy, 1971

Several methodologies relevant to the development of a safety program for the Korean Air Force were reviewed. Methodologies considered included:

- 1) Control charts
- 2) System safety analysis
- 3) Critical incident technique.

Data collection methods applicable to accident analysis were proposed.

Recommendations for the incorporation of these methods into a safety program for the K.A.F. were developed.

The safety program described in the current thesis possesses the potential for reducing overall operational costs and maximizing aircraft availability. The end result of such a program can only serve to increase operational readiness and thereby, maximize overall efficiency and military capability of the K.A.F.

Master of Science in
Operations Research
March 1981

Advisor: D. E. Neil
Department of
Operations Research

SIMULATION OF DISMOUNTED INFANTRY COMBAT IN URBAN TERRAIN

Bradford G. Loo
Captain, United States Army
B.S., United States Military Academy, 1972

This thesis presents the foundation for a stochastic simulation model that will represent dismounted infantry combat in urban terrain. The Simulation of Tactical Alternative Responses, STAR, ground-air combat model, which represents the parent simulation program for this proposed representation of urban combat, will be discussed in this document. Two state of the art urban combat models, MOBACS and URBWAR, will also be discussed. These two models were developed under contract for the United States Army but were never fully utilized as analytical tools. Certain aspects of these models lead to insightful approaches to the modelling of urban combat and these insights were instrumental in the development of this model. The major portions of this model are the representation of the terrain and the procedures for determining line of sight. Other areas of city fighting, e.g. movement and communications, were not modeled but will be discussed as future enhancements to this model.

Master of Science in
Operations Research
September 1981

Advisor: S. H. Parry
Department of
Operations Research

A SURVEY OF OPERATIONS RESEARCH TECHNIQUE
USAGE IN THE U.S. MARINE CORPS

Michael C. Mitchell
Captain, United States Marine Corps
B.S., United States Naval Academy, 1973

This thesis presents the results of a mailed survey of all officers currently serving on active duty in the United States Marine Corps who possess a secondary Military Occupational Specialty (MOS) of Operations Analyst (MOS code 9650). The questionnaire used was designed to determine the usage frequency and the relative importance of each of 35 Operations Research (OR) techniques and application areas to these Marine officers during their most recent tours in 9650 billets. In addition, the results were classified according to individual service rank, function area and type of OR work performed and a series of non-parametric statistical tests was conducted to determine significant differences. Comments elicited by the survey were also analyzed and recommendations were made based upon the conclusions drawn.

Master of Science in
Operations Research
March 1981

Advisor: G. Thomas
Department of
Administrative Sciences

A MODEL TO MEASURE BOMBARDIER/NAVIGATOR PERFORMANCE
DURING RADAR NAVIGATION IN DEVICE 2F114,
A-6E WEAPON SYSTEM TRAINER

Ted R. Mixon
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

This thesis modeled a performance measurement system for the Bombardier/Navigator (B/N) Fleet Replacement Squadron student during low level radar navigation flight in the Navy A-6E Weapon System Trainer. The model was designed to determine student skill acquisition measures for the purpose of providing information for decision-making by the squadron instructor and training manager. Model formulation methodology was based on a literature review of aircrew performance measurement from 1962-1980 and an analytical task analysis of the B/N's duties. Over 50 currently accessible candidate exercise (Derby) using A-6E fleet aircrews flying preprogrammed routes to establish performance standards using the candidate measures. Multivariate discriminate analysis was recommended for measure reduction. A sequential sampling decision model selected for evaluation provided fixed decisional error rates for successful training termination decisions and utilized both objective and subjective performance measures. Several display formats were recommended for use in debriefing.

Master of Science in
Operations Research
March 1981

Advisor: W. F. Moroney
Department of
Operations Research

STATISTICS PROGRAMS FOR THE APPLE II PLUS MICROCOMPUTER

James Darrell Morgeson
Major, United States Army
B.S., United States Military Academy, 1971

This paper presents a statistical software package developed for use on the Apple II Plus microcomputer, modified with the Apple Pascal language card. The program addresses the following: determination of confidence intervals for single and bivariate populations; hypothesis testing for one and two parameters; computation of cumulative distribution values for the Normal, Student's T, Chi-square, F, Binomial and Poisson distributions; computation of quantile values for the Normal, Student's T, Chi-square and F distributions. The program also has the capability to store, retrieve and modify data for use with the statistical procedures. The program was written in UCSD Pascal, which because of its portability indicates that little or no modification would be required to use it with other computers which are UCSD Pascal compatible. In addition, because of Pascal's block structure, the program can be easily modified or enhanced to include other statistical procedures which are of interest to the user.

Master of Science in
Operations Research
March 1981

Advisor: D. R. Barr
Department of
Operations Research

AN OPERATIONAL LANCHESTER-TYPE MODEL OF
SMALL-UNIT AMPHIBIOUS OPERATIONS

Soon Dae Park
Lieutenant Colonel, Republic of Korea Marine Corps
B.S., Republic of Korean Naval Academy, 1965

This thesis presents an operational Lanchester-type model of small-unit amphibious operations. This relatively simple model has been developed to demonstrate the basics of model building to the beginning student interested in amphibious warfare. The model is a time sequenced, deterministic, force-on-force combat model that is implemented on a digital computer. A brief discussion of considerations for modelling amphibious operations is given. The details of the model are presented for a specific amphibious-warfare scenario. Additionally, a computer terrain-contour-line plotting program is provided to assist the combat modeler to fit a parameterized-terrain to real terrain.

Master of Science in
Operations Research
September 1981

Advisor: J. G. Taylor
Department of
Operations Research

AN INTRODUCTION TO A RELIABILITY SHORTHAND

John J. Repicky, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

The determination of a system's life distribution usually requires the synthesis of a mixture of system survival modes. In order to alleviate the normal non-trivial calculations, this paper presents the concept of a reliability shorthand.

After describing the possible ways a system can survive a mission, the practitioner of this shorthand can use stock formulas to obtain a system's survival function. Then simple insertion of the failure rates of the system's components into the known equations results in the system's reliability.

Simple examples show the convenience of this shorthand. The TI-59 is demonstrated to be a useful tool, adequate to implement the methodology.

Master of Science in
Operations Research
March 1981

Advisor: J. D. Esary
Department of
Operations Research

A CROSS COMPILER AND PROGRAMMING SUPPORT
SYSTEM FOR THE HP41CV CALCULATOR

James Norman Richmann
Captain, United States Army
B.S., Iowa State University, 1971

With growing Army-wide use of programmable calculators, a system is needed to support the programming and testing of calculator software. This thesis provides a Fortran IV program to enable an operations research analyst to more efficiently write and document HP41CV calculator programs. Optical bar code readable by the HP41CV is generated by the program. Also given is an IBM EXEC II program which provides an interactive programming environment including online, self contained instructions. To illustrate the use of the system and the quality of the finished bar code and calculator program listings, examples are given including single variable statistics and linear programming. A final example provides a set of short utility routines which illustrate how programs can be developed for use in a calculator read-only-memory.

Master of Science in
Operations Research
September 1981

Advisors: S. H. Parry
R. H. Shudde
Department of
Operations Research

DYNAMIC ROUTE SELECTION FOR LAND COMBAT SIMULATION MODEL

Posma R. M. Situmorang
Major, Indonesian Army
Ir., Institute of Technology, Bandung, 1966

This thesis presents a dynamic route selection model for the ground combat simulation environment. An optimal route is selected for an advancing combat unit, taking known enemy location(s) into consideration. The selected route is in the form suitable for a single vehicle movement.

The model is explained in detail, the complete listing is displayed and some results from exercising the model are presented and discussed.

The exercise was conducted on a digitized terrain, yet with simple modification, it can work with functional terrain as well. The modification is explained, along with others that may be of interest to users.

Conceptual methods of expanding the model to consider unit formation in the route selection process is presented. A number of ways to enrich this routine, namely to consider enemy elements instead of units, diversification of enemy threats, etc., are also discussed.

Master of Science in
Operations Research
March 1981

Advisors: S. H. Parry
J. L. Ellis
Department of
Operations Research

A STRUCTURE FOR THE DEVELOPMENT OF AN ENGINEER MODEL

Patrick J. Slattery
Captain, United States Army
B.S., Polytechnic Institute of Brooklyn, 1971

This thesis presents the basic outline and structure for the development of an engineer model which will be incorporated into the STAR land combat simulation model. A discussion of common engineer missions, U.S. and Soviet engineer units, and their organizations and methods of operations, is used to motivate the focusing of attention on two events which are the emplacement and the breaching of obstacles fields. Several measures of effectiveness are suggested for use in determining how obstacles, and thereby engineer forces, influence the battle and battle outcome.

Master of Science in
Operations Research
December 1980

Advisor: J. K. Hartman
Department of
Operations Research

ESTIMATING THE DEMAND UNCERTAINTY IN SINGLE-PERIOD INVENTORY PROBLEMS
USING THE GOMPertz CURVE AND THE SCHMEISER-DEUTSCH DISTRIBUTION

Pranom Srinopakoon
Captain, Royal Thai Air Force
B.S., Chulalongkorn University, Thailand, 1971

The optimal order quantity for the case of uncertainty in the newsboy problem depends on the maximum demand. In previous work it was assumed that the demand distribution was known. In practice, this is often not the case. This study suggests some procedures which can be used to estimate the demand distribution even if data on unsatisfied demands are not available.

Master of Science in
Operations Research
September 1981

Advisor: G. F. Lindsay
Department of
Operations Research

STATISTICS PROGRAMS FOR THE TI-59 CALCULATOR

Richard William Storer
Captain, United States Air Force
B.S., United States Air Force Academy, 1972

This paper presents a package of nine programs for the TI-59 calculator. This package was developed and as a solution to two problems. One problem involved expanding and *modifying an existing set of programs*; and a second problem involved developing five distribution approximating programs. The solution to these problems represents a package with considerable capability in computing confidence intervals, performing hypothesis tests and approximating distribution values. The distribution approximations include inverse CDF values for the Normal, Chi-square, Student's t and F distributions, which allow the computation of confidence intervals without using tables.

The TI-59 proved to be a useful tool in solving these problems and demonstrated the capability of hand-held programmable calculators. The comprehensive set of user guides included in this programming package provides even the inexperienced user with a step-by-step introduction to this capability. Additionally, the methods used in preparing this programming package are directly applicable to other calculators or computers.

Master of Science in
Operations Research
December 1980

Advisor: D. R. Barr
Department of
Operations Research

PERFORMANCE IN THE 9D5 MULTI-PLACE UNIVERSAL
UNDERWATER EGRESS TRAINER: PHYSIOLOGICAL
AND BEHAVIORAL CORRELATES

Howard Marion Tillison
Lieutenant, United States Navy
B.S., Georgia Institute of Technology, 1974

From 1969 through 1972, 78 Navy helicopters crashed at sea with a loss of 63 lives (10 due to injuries; the remaining 53 persons either drowned or were lost at sea). To reverse the trend toward fatalities following aircraft crashes at sea, the Navy has begun training all flight personnel in the 9D5 Multi-Place Universal Underwater Egress Trainer. This thesis examined the relationships between trainee performance ($n=267$) in the 9D5 device, swimming test scores and subjective anxiety scores. Mile-swim times were predictive of group (but not individual) performance in the 9D5 device with faster swimmers performing better. Poor egress performance when blindfolded was attributed to egress path difficulty and disorientation. Findings can be applied to the design of egress aids, training and motivation of subjects and the effects of anxiety upon subject performance in carrying out sequential tasks while totally immersed in water.

Master of Science in
Operations Research
March 1981

Advisor: W. F. Moroney
Department of
Operations Research

COMPARISON OF INTERPOLATION AND CONTOUR CONSTRUCTION METHODS
APPLICABLE TO THE MX VALLEY SOIL SAMPLING PROJECT

Haluk Ünalı
Lieutenant, Turkish Navy
B.S., United States Naval Postgraduate School, 1981

The objective is to obtain and compare interpolation methods and contour plot techniques, based on data from sites whose locations are irregular or scattered. Data from the 1980 Fugro report on MX Valley soil samples serves as a test bed.

Two groups of data, seismic p-wave velocities and surface soil depth were studied using six different interpolation methods and three different contour plot techniques. Comparison of the interpolation methods and of the contour plot techniques are made.

Master of Science in
Operations Research
September 1981

Advisor: R. R. Read
Department of
Operations Research

ANALYSIS OF MARINE CORPS SMALL ARMS PROFICIENCY
WITH EMPHASIS ON REQUALIFICATIONS

Charles Edward Walters
Captain, United States Marine Corps
B.S., University of Tennessee, 1972

The purpose of the study was to determine to what extent an individual's marksmanship performance is degraded after a one, two, three, or four plus year gap in his small arms weapon requalification history. The study reviews the physiological aspects of proficient shooting and the effects of the environment on marksmanship shooting. The analysis was performed on the complete qualification history of 1,694 U.S. Marine Corps officer and enlisted personnel who had qualified with a pistol or rifle three or more times during their Marine Corps career. The results of the analysis indicated that there was no statistical degradation in shooting performance for both the officer and enlisted populations over gaps of one or more years when firing the rifle. In the case of the pistol, there was no statistical degradation in performance for the officer population with a gap of one or more years in shooting history; however, the enlisted population shows statistical evidence of degradation in performance after a three or more year gap in shooting history.

Master of Science in
Operations Research
September 1981

Advisors: D. R. Barr
D. E. Neil
Department of
Operations Research

MASTER OF SCIENCE
IN
PHYSICS

AN INVESTIGATION OF PLASMA - SURFACE INTERACTIONS ON
SELECTED CONDUCTORS AND INSULATIONS

Joseph Henry Barker, III
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1967

and

Robert Jacque Rush
Lieutenant Commander, United States Navy
B.S., Prairie View A&M College, 1972

Damages caused by plasma-surface interactions is of concern in fields involving the use of such plasma devices as particle beam weapons, high power lasers and controlled thermonuclear fusion reactors. Several conductors and non-conductors were exposed to a plasma to study the plasma-surface interaction damage.

In one part of the study, the plasma was induced by irradiating the surface of the samples with a Q-switched neodymium laser. Some of the samples were irradiated in air, at atmospheric pressure, and in a vacuum, to compare the difference in the extent of the damage on the same types of samples at different pressures. In the other part of the study, several titanium coated conductors and titanium coated non-conductors were exposed to the plasma of a tokamak.

Both the metal conductors in the first part of the study, and the titanium coatings in the second part of the study, were damaged by unipolar arcing. Nickel showed less evidence of unipolar arcing damage than any of the other samples studied.

Master of Science in
Physics
December 1980

Master of Science in
Engineering Science
December 1980

Advisors: F. Schwirzke
Department of
Physics and Chemistry
K. D. Challenger
Department of
Mechanical Engineering

AN EXPERIMENTAL COMPARISON OF PUMPED SUPERLUMINAL
ELECTROMAGNETIC RADIATION TO CERENKOV RADIATION

Jerry Lee Graham
Lieutenant, United States Navy
B.S., United States Naval Academy, 1975

Experiments were conducted to measure the intensity of radiation emitted by a superluminal 100 MeV electron moving through a static, periodic, plane polarized magnetic field oriented perpendicular to the electron's trajectory. Such radiation is known as pumped superluminal electromagnetic radiation (PSER). Comparison was then made with the intensity of Cerenkov radiation emitted by a superluminal 100 MeV electron without a pump field. It was found that the PSER was $12.78\% \pm 0.75\%$ more intense than the Cerenkov radiation.

Master of Science in
Physics
December 1980

Advisor: F. R. Buskirk
Department of
Physics

AN INVESTIGATION OF UNIPOLAR ARCING IN
VARIOUS CONDUCTORS AND METALLIC GLASSES

Todd Jeffrey Hoover
Lieutenant, United States Navy
B.S., Ohio State University, 1974

An investigation of unipolar arcing in various conductors and surface preparations was undertaken. A discussion on the production of "glassy" surfaces on various metals, and their susceptibility to unipolar arcing is also presented.

All experiments were conducted using a neodymium glass laser in a Q-switched mode to generate a hot plasma. Results show that stainless steel and mild commercial steel arc vary heavily, in agreement with past researchers. Titanium undergoes arcing at a lesser crater density but over a greater surface area while HY 130 undergoes arcing at a low crater density. Commercially prepared metallic glass $\text{Fe}_{80}\text{B}_{20}$ and Poco graphite do not arch at all.

Experiments were conducted in an attempt to produce metallic glass coatings on stainless steel, HY 130, and mild commercial steel (1030). Coatings produced were exposed to a laser produced plasma and arcing was found to be present in all cases but at a lower arc density. In conjunction with attempts to produce metallic glass surface coatings on metals, an experiment was done to determine the energy density required for the inset of plasma production in type 304 stainless steel.

Master of Science in
Physics
September 1981

Advisor: F. Schwirzke
Department of
Physics and Chemistry

FINITE-AMPLITUDE STANDING WAVES IN A RECTANGULAR
CAVITY WITH WEDGE-TYPE BOUNDARY PERTURBATION

Ilbok Joung
Lieutenant Commander, Korean Navy
B.S.E.E., Seoul National University, 1974

Finite amplitude acoustic standing waves in a rectangular air-filled cavity with various wedge-shape boundary perturbations were studied both experimentally and theoretically.

The experimental results showed that geometrical perturbations alter the finite amplitude behavior of the cavity and that the nature of these changes are in qualitative agreement with the predictions of the theory. However, quantitative agreement was not observed possibly because the perturbation chosen did not satisfy all the assumptions of theory.

There does not seem to be any fundamental obstacle preventing the choice of a perturbation that would allow the theory to be critically tested.

Master of Science in
Physics
December 1980

Advisor: J. V. Sanders
Department of
Physics and Chemistry

STUDY OF THE PERFORMANCE PARAMETERS OF A FLIR SYSTEM

Yong Bok Lee
Lieutenant Colonel, Republic of Korea Army
B.S., Korean Military Academy, 1966

and

Chang Hyun Park
Lieutenant Colonel, Republic of Korea Army
B.S., Korean Military Academy, 1965

The performance parameters of Detectivity and Noise Equivalent Temperature Difference for a Forward Looking Infra-Red (FLIR) systems were measured after optimization of the system. The achieved performance approached the theoretically evaluated limiting values.

Master of Science in
Physics
June 1981

Advisor: E. C. Crittenden
Department of
Physics and Chemistry

CHARACTERISTICS OF GEOMAGNETIC POWER SPECTRA ON LAND
AND SEA IN THE PERIOD RANGE 0.2 TO 400 SECONDS

Gary M. McKinley
Lieutenant, United States Navy
B.S., Tulane University, 1974

and

Robert M. Santos
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

Geomagnetic field fluctuations in the 0.025-5Hz range were measured with Cesium vapor magnetometer on the sea floor in Monterey Bay, and at a remote land site. Correlation was found between the geomagnetic activity A-index and both the slope and relative magnitude of the power spectra. More active days showed a greater fall-off as frequency increased, and a higher level of the observed power spectra. Fluctuations averaging $0.1 \text{ nT}^2/\text{Hz}$ were noted at the low frequencies, dropping to $10^{-5} \text{ nT}^2/\text{Hz}$ at 1 Hz. Comparisons were made between the land/sea and day/night data to determine the sea and diurnal effects. In addition to swell induced fluctuations, the overall power spectra for sea data is 10-15 dB higher than land data. Diurnal shifts indicate a 20 second period increase in the nighttime Pc 3 fluctuations. Daytime intensity is generally 5 dB above the nighttime data then running 3 to 5 dB above the day. Further observations were made to determine the applicability of the magnetometer for non-seismic detection of nuclear blast.

Master of Science in
Physics
December 1980

Advisor: P. Moose
Department of
Electrical Engineering

CERENKOV RADIATION PRODUCED BY 100 MEV ELECTRONS

David Earl McLaughlin
Lieutenant Commander, United States Navy
B.S.M.E., Michigan State University, 1969

It is proposed that electromagnetic radiation of a specified frequency can be produced as a result of stimulated Cerenkov radiation in a dielectric resonator excited by a superluminal electron beam. The frequency generated is a function of three physical parameters. They are the electron energy, the thickness of the dielectric resonator and its index of refraction. This work provides a theoretical derivation for predicting the frequency of stimulated Cerenkov radiation in a dielectric slab. The first experimental results using extremely relativistic electrons are reported, and the problems encountered are outlined with some suggestions for improvements. The results of this validation show that the observed frequency differs from the predicted frequency by less than 1.5%. Incidental to the conduct of this experiment, ordinary Cerenkov radiation in the usual cone was observed in air at microwave frequencies. A possible application of the stimulated Cerenkov process as an electron beam monitor is briefly discussed.

Master of Science in
Physics
June 1981

Advisor: F. P. Luskirk
Department of
Physics and Chemistry

A STUDY OF THE UNIPOLAR ARCING DAMAGE MECHANISM
ON SELECTED CONDUCTORS AND SEMICONDUCTORS

Franklin Terrence Rvan
Lieutenant Commander, United States Navy
B.S., University of Washington, 1969

and

Stephen Tucker Shedd
Commander, United States Navy
B.S., Georgia Institute of Technology, 1968

A broad investigation, experimental and theoretical, of the mechanism of unipolar arcing has been conducted. A theoretical discussion of existing unipolar arc models is presented. Experimental and theoretical evidence is used to support the Schwirzke-Taylor Model at the expense of other models. Three current models of arc motion are examined and refuted.

Experimental results show that aluminum and various steels arc heavily, molybdenum and nickel to a lesser extent, and commercially prepared metallic glasses not at all. The semiconductors showed some arcing on germanium but none on silicon.

Experiments showed that grain boundaries play no significant role in unipolar arc initiation.

Experiments were conducted in which a laser produced metallic glass is exposed to the plasma produced by the same laser pulse. The results are used to refute the microwhisiker explosion models of unipolar arc initiation.

Master of Science in
Physics
June 1981

Advisor: F. Schwirzke
Department of
Physics and Chemistry

CONICAL LENS FOR 5"/54 GUN LAUNCHED MISSILE

James M. Terrell
Lieutenant, United States Navy
B.S., University of Oklahoma, 1975

Under the sponsorship of the Defense Advanced Research Projects Agency (DARPA), a conical lens for a 5"/54 ramjet propelled, optically guided projectile was investigated. The resulting conical lens for the gun-launched missile (GLM) will focus parallel incident light through the lens to a design focal point. A conical lens was designed using an algorithm written for the HP-9845T desktop minicomputer. The examples illustrate the automated design procedure, selection of possible lenses and final lens design. Recommendations for further research are discussed.

Master of Science in
Physics
June 1981

Advisor: A. E. Fuhs
Department of
Aeronautics

A PROBABLE BREAKDOWN MECHANISM IN THE ELECTRON BEAM SUSTAINED CO₂ LASER

Rodney Deayne Timm
Lieutenant, United States Navy
B.A., Bemidji State College, 1969

A stable high-pressure electric discharge is produced using an electron-beam to ionize the gas in the CO₂-N₂-He laser. The important electron loss process in this type of discharge are recombination and attachment. The prominent instability in the non-self-sustaining discharge is the streamer which leads to arcing and complete breakdown of the gas. A qualitative analysis of streamer formation based on the ionization and resultant electron production of secondary electrons to setup an avalanche starting the chain which produces a highly conductive channel and results in the complete breakdown of the gas is presented. The onset of streamer formation at the anode is aided by local release and ionization of neutral atoms. The resulting increase of the plasma pressure leads to an increase of the potential and the onset of unipolar arcing.

Master of Science in
Physics
June 1981

Advisor: F. Schwirkzke
Department of
Physics and Chemistry

DISTRIBUTED APERTURES IN LAMINAR FLOW LASER TURRETS

Brian Brooks Tousley
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1976

Assume a technology that permits undistorted laser beam propagation from the aft section of a streamlined turret. A comparison of power on a distant airborne target is made between a single aperture in a large scale streamlined turret with a turbulent boundary layer and various arrays of apertures in small scale streamlined turrets with laminar flow. The array performance is mainly limited by the size of each aperture. From an array one might expect, at best, about 40 percent as much power on the target as from a single aperture with equal area. Since the turbulent boundary layer on the large single-turret has negligible effect on beam quality, the array would be preferred (if all development efforts were essentially equal) only if a laminar wake is an operational requirement.

Master of Science in
Physics
September 1981

Advisor: A. E. Fuhs
Department of
Aeronautics

MASTER OF SCIENCE
IN
SYSTEMS TECHNOLOGY

VARIABILITY AND SENSITIVITY OF COUPLED
MIXED LAYER-ACOUSTIC MODEL SYSTEMS

Rory H. Fisher
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

This study is the first reported analysis of coupled mixed layer-acoustic model systems. The analysis emphasizes the performance of the combined systems rather than the acoustic or ocean models separately. Acoustic variability of the coupled model systems was studied in terms of the median detection range (MDR). Synoptic time variations of MDR as a function of figure of merit, frequency, and receiver depth were analyzed during the month of May 1980 at OWS "Papa" in order to provide a better insight into the operational capabilities of model systems to accurately represent the actual oceanic variability. The results of this limited analysis revealed that the model systems displayed more day-to-day acoustic (MDR) variability than did direct environmental input (BT).

The capability to accurately model the thermal structure was reviewed with the following results. No significant correlation was observed between the EOTS model and the actual BT mixed layer depths while there appeared to be a strong positive correlation between the ODT model (driven by atmospheric forcing) and the BT mixed layer depths. Moreover, a possible lag of two days was observed in the EOTS model mixed layer depth relative to the observed mixed layer depth time series.

Master of Science in
Systems Technology
March 1981

Advisors: C. R. Dunlap
R. W. Garwood, Jr.
Department of
Oceanography

RAPID OCEANOGRAPHIC DATA GATHERING: SOME PROBLEMS IN USING REMOTE
SENSING TO DETERMINE THE HORIZONTAL AND VERTICAL
DISTRIBUTIONS IN THE NORTHEAST PACIFIC OCEAN

Glenn W. Lundell
Lieutenant, United States Navy
B.S., University of Miami, 1973

NOAA-6 satellite AVHRR data and AXBT data collected in the Northeast Pacific Ocean in late 1980 as part of the Naval Postgraduate School-sponsored Acoustic Storm Transfer and Response Experiment which was in turn part of the U.S.-Canadian Storm Transfer and Response Experiment (STREX). Some of the problems in transferring AXBT geographical positions to satellite images were solved by designing a computer program with accuracies of less than 2 pixels. Thermal comparisons were made between AXBT, NOAA-6, and GOSSTCOMP data with the results that NOAA-6 data was on the average 2.9°C colder than AXBT data and 3.2°C colder than GOSSTCOMP data. Linear regression methods reduced to 0.3°C the difference between NOAA-6 and AXBT data. Use of this method over a period of 15 days produced a mean error of 0.5°C .

Although NOAA-6 cannot sense directly the subsurface thermal structure, it is excellent for observing surface manifestations of horizontal thermal features. Further investigation into using satellite data as the basis of an empirical relationship between the surface temperature and the subsurface vertical thermal structure is warranted.

Master of Science in
Systems Technology
September 1981

Advisor: G. H. Jung
Department of
Oceanography

VOICE RECOGNITION AS AN INPUT MODALITY FOR
THE TACCO PREFLIGHT DATA INSERTION TASK
IN THE P-3C AIRCRAFT

John Laughlin Taggart, Jr.
Lieutenant Commander, United States Navy
B.A., California State University Chico, 1969

and

Charles Darwin Wolfe
Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1968

An experiment was conducted to compare accuracy and entry speed capabilities of a standard keyboard with the Threshold Technology T-600 voice recognition unit in the performance of an operational data entry task in the P-3C aircraft. A computer program was written to simulate the data entry capabilities of the P-3C operational software. Thirteen military officers executed a P-3C Tactical Coordinator's preflight task of entering data into the Stores Management and Navigation Preflight tableaux.

Overall, voice entry was found to be faster for the Stores Management data entry task and slower for the Navigation Preflight tableaux task with comparable accuracy. But, for subjects with prior voice input experience, voice input was faster than keyboard entry for both tableaux.

Master of Science in
Systems Technology
March 1981

Advisor: D. Neil
Department of
Operations Research

MASTER OF SCIENCE

IN

**SYSTEMS TECHNOLOGY
COMMAND, CONTROL AND
COMMUNICATIONS (C3)**

INVESTIGATION OF PARAMETERS AFFECTING VOICE RECOGNITION
SYSTEM IN C³ SYSTEMS

Mary Pamela Batchellor
Lieutenant Commander, United States Navy
B.A., George Mason University, 1970

This research investigates the use of a voice recognition system by military operators -- officer, enlisted, male and female. The application intended is the use of a discrete utterance voice recognition system in a command center environment. The system would be used by members of a watch team to execute ad hoc queries against an automated data base in support of their command center duties. The following factors were examined:

- The adaptability of a random sample of active duty military personnel to a voice input system.
- the accuracy of such a system.
- the effects of male versus female operators.
- the effects of officer versus enlisted operators.
- The advantages/disadvantages of using three, five or ten training passes to train the voice system.

Results showed no significant difference in error rates between the categories of officer and enlisted nor between male and female. Three training passes had a slightly higher error rate than five or ten passes but five and ten passes were the same.

Master of Science in
Systems Technology - C³
March 1981

Advisor: G. K. Poock
Department of
Operations Research

A GRAPHIC TUTORIAL AND DECODING PROGRAM
FOR NAVY SIGNAL FLAGS AND PENNANTS

Jay Kent Bien
Lieutenant Commander, United States Navy
B.S., Purdue University, 1971

This is a highly graphic user-oriented interactive software product which will assist the user to become more proficient at recognizing and employing Navy signal flags and pennants which are used for visual communications between naval vessels of all types. A tutorial portion of the program has been designed with a number of options, thereby allowing a user to tailor a recognition program to satisfy specific learning requirements. The program is also capable of graphically displaying any grouping of flags and pennants chosen by the user in flaghoist order. When the flags and pennants are arranged in accordance with the procedural doctrine set forth in the ALLIED MARITIME TACTICAL SIGNAL BOOK, ATP 1(B), Volume II, the program demonstrates the capability of decoding the displayed signal into its predetermined meaning. The current program is resident in the Secure Command, Control and Communications Exercise Laboratory (C³ Lab) at the Naval Postgraduate School.

Master of Science in
Systems Technology - C³
March 1981

Advisor: Capt W. P. Hughes, Jr
Department of
Operations Research

EVALUATION OF THE ARTIFICIAL INTELLIGENCE PROGRAM STAMMER2
IN THE TACTICAL SITUATION ASSESSMENT PROGRAM

John Peter Ferranti, Jr.
Lieutenant Commander, United States Navy
B.S., Marquette University, 1968

STAMMER2 (System for Tactical Assessment of Multisource Messages, Even Radar) is an experimental program created as part of an investigation into methods of correlating information in the naval environment. This thesis is an exploration into the application of artificial intelligence to the tactical situation assessment problem and into various evaluation methodologies for STAMMER2. Included is an overview of one of these experiments, using the facilities of the Naval Postgraduate School Command, Control and Communications Laboratory and the Naval Ocean Systems Center, San Diego.

Master of Science in
Systems Technology - C³
March 1981

Advisors: D. H. Barr
G. T. Howard
Department of
Operations Research

COMMAND CENTER NETWORK: SCOPE AND APPLICATIONS

George Kendall Hamilton, Jr.
Lieutenant, United States Navy
B.A., Case Western Reserve University, 1974

The Command Center Network (CCN) is a computer network designed to interconnect a diverse group of heterogeneous shipboard information and Command and Control (C2) subsystems. This local network will utilize a single, high-speed data bus installed on the individual platform. As this network is envisioned, such subsystems as NTDS, NAVMACS, CCIS, SSES, TSA, CV-TSC, and CV-IC will be interconnected in order to correlate information to provide the best possible decision base for the commander. The Tactical Flag Command Center (TFCC) concept, which the CCN is essentially designed to support, is considered by the Navy as the nerve center of future Command and Control. The CCN is envisioned to be the backbone of the TFCC. This thesis examines the system development of the CCN.

Master of Science in
Systems Technology - C³
March 1981

Advisor: F. R. Richards
Department of
Operations Research

AN EXPERIMENT IN VOICE DATA ENTRY FOR
IMAGERY INTERPRETATION REPORTING

Gregory T. Jay
Captain, United States Air Force
B.S. Ed., Miami University of Ohio, 1970
M.S. Ed., Miami University of Ohio, 1971

This thesis investigated the feasibility of voice data entry for imagery intelligence order of battle reporting. Time, accuracy and efficiency were measured for 20 subjects in an experiment physically simulating the use of a light table, optics, and an interactive computer system for reporting. A Threshold Technology Inc. T600 voice recognition system was used for a large, unstructured vocabulary (255 words) of unclassified Soviet/Warsaw Pact equipment names, alphanumeric, and editing commands. The T600 recognition accuracy for this experiment was 97.0% without rejects and 95.5% with rejects.

Buffered voice and unbuffered voice modes of the T600 were evaluated with typing: buffered voice was 58% faster and unbuffered voice 41% faster than typing. Voice was also found to be as accurate as typing for writing short order of battle reports. Finally, subjects preferred voice for several criteria evaluated before and after the experiment.

Master of Science in
Systems Technology - C³
March 1981

Advisor: G. Poock
Department of
Operations Research

SOVIET COMMAND AND CONTROL IN AN HISTORICAL CONTEXT

Jeffrey A. Kern
Captain, United States Army
B.S., Stanford University, 1970

An examination is made of the historical antecedents of present day command and control doctrine in the Soviet Union. The continuity of principal characteristics is demonstrated. The ideological determinants shaping the command and control system are first developed. These include centralism, collective decision-making, unity of command, and redundancy. Practical consequences of these are explored. The functioning of Soviet command and control during World War II is addressed in detail with emphasis on the uniquely Soviet aspects. Current Soviet command and control concepts are addressed in a general way and linked to historical precedents and ideological precepts. Primary source materials are open Soviet doctrinal and historical publications in translation.

Master of Science in
Systems Technology - C³
March 1981

Advisor: W. Reese
Department of
Physics and Chemistry

USING VOICE RECOGNITION EQUIPMENT TO RUN
THE WARFARE ENVIRONMENTAL SIMULATOR (WES)

William Joseph McSorley III
Lieutenant Commander, United States Navy
B.A., Princeton University, 1970

A great deal of study has been conducted in the last ten years concerning the use of voice recognition equipment with computers. It was hoped that its use would reduce the required entry time and error rate and improve the man-machine interface between the user and the computer.

There are many potential applications for such voice recognition use in the military and specifically in the area of Command, Control and Communications (C³). War games are often used today to test the effectiveness of C³ technologies and WES is one such war game.

This paper will assess the feasibility of using voice recognition equipment to run WES by comparing the results of an experiment employing both voice and manual typing input modes. The results show that in this particular task typing does a somewhat better job than the buffered voice mode, while unbuffered voice has very poor results.

Master of Science in
Systems Technology - C³
March 1981

Advisor: G. K. Poock
Department of
Operations Research

AN INTERACTIVE MILITARY PLANNING GAME FOR THE
NAVAL POSTGRADUATE SCHOOL COMMAND, CONTROL
AND COMMUNICATIONS LABORATORY

Scott Cameron Rounce
Captain, United States Air Force
B.A., University of Northern Colorado, 1974
M.A., University of Northern Colorado, 1975
M.B.A., California State University, Dominguez Hills, 1979

This thesis implements an adaptation of the TEMPO Military Planning Game for use interactively in the Naval Postgraduate School Command, Control and Communications (C³) Laboratory. The primary purpose of the game is to provide simulated experience in the allocation of budgetary resources for the development, procurement and maintenance of military systems with realistic constraints of limited time and budget and a degree of uncertainty.

Although the game is resident on the PDP 11/70 computer in the C³ Laboratory, it could be easily transported to any other similar computer system which had the same operating system.

Master of Science in ³
Systems Technology - C
March 1981

Advisor: F. R. Richards
Department of
Operations Research

IMPROVED C³ LABORATORY CAPABILITIES FOR COMMAND AND
CONTROL RESEARCH, ANALYSIS AND GAMING

Thomas Alan Secorsky
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

and

Thomas Patrick Stack
Lieutenant Colonel, United States Air Force
B.S., United States Air Force Academy, 1959

This thesis contains software, procedures and methodologies that can be utilized in the C³ Laboratory to experiment with and game command and control problems in the areas of organizational relationships, communications networks and analysis of procedures, combat doctrine or tactics. The demonstration game herein utilizes the Warfare Environment Simulator (WES), the organizational structure and concept of decentralized command embodied in the Composite Warfare Commander Doctrine, an automated scenario generator, software resident at ACCAT, and the primary software product of this thesis: a user-defined communications network supporting a multi-level chain of command that allows for communications delays, garbled messages, message non-delivery, and player attrition.

Master of Science in
Systems Technology - C³
March 1981

Advisor: W. P. Hughes, Jr.
Command, Control &
Communications Academic
Group

MASTER OF SCIENCE

IN

**TELECOMMUNICATIONS
SYSTEMS
MANAGEMENT**

APPLICATION OF SATELLITE IMAGERY TO THE
ASSESSMENT AND EXPLOITATION OF OCEANIC
ELECTROMAGNETIC DUCTING

Larry Francis Lewis
Captain, United States Marine Corps
B.S., Southern Colorado State College, 1972

The nature of the vertical and horizontal properties of the atmospheric refractive index and its effects upon modern electromagnetic systems are described.

The methodology and constraints associated with refractive effects prediction in a task force environment are also addressed.

Satellite imagery of occurrences of amateur radio tropospheric communications between California and Hawaii is used to identify significant meteorological features of the trans-Pacific ducting environment.

Utilization of satellite imagery to provide large scale oceanic synoptic data in conjunction with near real-time refractive effects assessment appear to provide the modern task force commander with the quantitative data required for tactical exploitation of the ducting environment.

Master of Science in
Telecommunications Systems Management
March 1981

Advisor: K. L. Davidson
Department of
Meteorology

AN INVESTIGATION OF COMMUNICATIONS MANAGEMENT AND CONTROL
REQUIREMENTS AND THEIR POSSIBLE APPLICATIONS
TO THE MTACCS TACTICAL DATA SYSTEMS

Donald C. Mahler
Captain, United States Marine Corps
B.S., Minot State College, 1972

The Marine Corps Tactical Command and Control System (MTACCS) is expected to significantly enhance the decision-making capability of tactical commanders. The Landing Force Integrated Communications System (LFICS) provides the data communications for this capability.

This thesis examines the impact of that enhanced capability with particular emphasis given to the management and control of the message and circuit switched systems envisioned to carry the bulk of MTACCS data traffic. Recommendations for improved communications management and control focus in those areas, which, in the opinion of the author, require major doctrinal modifications. Changes in communications system employment and organizational structure are evaluated with the objective of providing the commander a flexible, reliable and responsive communications system with which to exercise command and control.

Master of Science in
Telecommunications Systems Management
March 1981

Advisor: A. L. Schoenstadt
Department of
Mathematics

A METHODOLOGY FOR ECONOMIC ANALYSIS OF
PROPOSED AUTOMATION PROJECTS OF THE SHORE SUBSYSTEM OF
THE NAVAL TELECOMMUNICATIONS SYSTEM

Joanne M. Mosig
Lieutenant, United States Navy
B.S., Jacksonville University, 1976

This thesis presents a historical perspective on progress toward the objective of automating the Naval Telecommunications System (NTS) in the most economical manner possible. In addition, a methodology for conducting economic analysis of proposed automation projects will be developed. This methodology is based on concepts such as the analysis of geographical areas and telecommunications needs therein, as opposed to the current practice of site-by-site analysis. The basic premise of the methodology is that comparisons should be based upon incremental present value life cycle cost and incremental improvement in effectiveness measures for multiple alternatives. An actual application of the methodology will be presented, using data compiled for the automation feasibility studies in the Norfolk and New Orleans areas. Finally, conclusions and recommendations will be presented based upon these evaluations.

Master of Science in
Telecommunications Systems Management
March 1981

Advisor: D. C. Boger
Department of
Administrative Sciences

A MODEL OF THE DOMESTIC COMMERCIAL SATELLITE INDUSTRY:
A DIFFERENT PERSPECTIVE

Pamela M. Mulvehill
Lieutenant, United States Navy
B.A., Eisenhower College, 1972

The domestic satellite (DOMSAT) industry has progressed through many stages of development in its short history. These stages of development are based on the areas of influence that deeply effect the direction of the industry. Based on the author's model of industry structure, conduct and performance, a model of the telecommunications industry past and present is developed. The stages of the telecommunications industry are based on the premise that various external environmental factors played a key role in influencing the industry as it progressed over time. Satellite communications technology has its base in the telecommunications industry and thus follows a similar pattern of development through four major stages of growth that impact the DOMSAT industry structure, conduct and performance.

Master of Science in
Telecommunications Systems Management
March 1981

Advisor: D. C. Boger
Department of
Administrative Sciences

METHODS OF COST REDUCTION FOR
UNITED STATES COAST GUARD
TELEPHONE SYSTEMS

Russell N. Terrell
Lieutenant, United States Coast Guard
B.S., Nicholls State University, Thibodaux, LA, 1975

Although this thesis is primarily intended for use by managers of United States Coast Guard telecommunications facilities, it is equally applicable to other government and private sector managers. Many methods of reducing the costs of telecommunications are addressed throughout the thesis. These methods are a mixture of the author's years of experience in this field as well as a collection of ideas from writings of experts in telecommunications management and interviews with current and past managers of telecommunications facilities. An attempt has been made to keep the presentation in layman's terms to facilitate the use of the thesis at all levels of management. To assist in understanding telecommunications terms, a glossary has been included. Additionally, a guide for Coast Guard procurement of telephone equipment has been included to assist and encourage procurement for cost savings through consolidation of facilities and introduction of new technology.

Master of Science in
Telecommunications Systems Management
March 1981

Advisor: D. C. Boger
Department of
Administrative Sciences

MASTER OF ARTS

IN

**NATIONAL
SECURITY
AFFAIRS**

MASTER OF ARTS

IN

**NATIONAL
SECURITY
AFFAIRS**

UNITED STATES SECURITY INTERESTS IN CHINA: BEYOND THE 'CHINA CARD'

Joseph Frederick Bouchard
Lieutenant, United States Navy
B.S., United States Naval Academy, 1976

The relationship between the United States and the People's Republic of China is developing rapidly in the realm of military and security affairs. The thesis of this paper is that, although the Sino-American relationship has been founded upon a mutual interest in opposing the Soviet military threat, the long-term development of the relationship will depend on the extent to which the scope of mutual interests can be broadened and the many latent sources of tension between China and America alleviated. A broad definition of national security, encompassing political and economic as well as military factors, and an alternative conceptual framework for analyzing international politics are proposed for defining security interests. Security issues examined include the Soviet threat to China; the U.S. interest in the security of China; China's role in Soviet-American relations, and American interests in a military relationship with China, including naval operations.

Master of Arts in
National Security Affairs
September 1981

Advisor: C. A. Buss
Department of
National Security Affairs

UNITED STATES NATIONAL INTERESTS IN CHINA:
A POST-NORMALIZATION ANALYSIS

Donald Philip Brown
Major, United States Air Force
B.A., Brigham Young University, 1969

This thesis analyzes the origin and evolution of United States economic and strategic interests in China, showing how they have been affected by the progressive political and economic developments within China. Special attention is paid to the problems of transfers from the U.S. in the light of their probable effects on China's future and on U.S. diplomatic relations in other parts of the Asian region.

Master of Arts in
National Security Affairs
June 1981

Advisor: C. A. Buss
Department of
National Security Affairs

NAVAL IMPLICATIONS OF THE STRATEGIC ARMS LIMITATION TALKS

Grant Joseph Caughey
Lieutenant, United States Navy
B.S., University of Kansas, 1974

This thesis surveys the naval implications of the treaty outcomes resulting from the Strategic Arms Limitation Talks (SALT). The fundamental hypothesis is that a correlation implying a causative relationship exists between the naval outcomes of SALT I and SALT II (dependent variable) and asymmetries in U.S. and Soviet negotiating methodology (independent variable). Assessment of the dependent variable is accomplished through systematic examination of the treaty outcomes relevant to the naval capabilities of the two negotiating parties. These outcomes include the impact of SALT-imposed SLBM and SSBN numerical limitations upon fleet ballistic missile (FBM) force modernization, implications for sea-launched cruise missiles (SLCMs), naval air-launched cruise missiles (ALCMs), sea-based ABM/ATBM deployment options, and the naval significance of SALT outcomes relating to land-based naval air and potential ICBM/IRBM anti-ship targeting. The independent variable of negotiating approaches is evaluated through systematic scrutiny of the public SALT negotiating history. Although evidence is not entirely conclusive, the hypothesis seems to be sustained.

Master of Arts in
National Security Affairs
December 1980

Advisor: D. S. Yost
Department of
National Security Affairs

THE SOVIET UNION AND IRAN STRATEGIC IMPLICATIONS
FOR THE UNITED STATES NAVY

LeRoy Windsor Chapple
Lieutenant Commander, United States Navy
B.A., University of Washington, 1971

This thesis examines the nature and the scope of Soviet relations with Iran with particular emphasis on the Iranian Revolution of 1978-79 and the Iranian-Iraqi War which, as of this writing is still in progress. The analysis focuses on 1) the importance of Iran to Soviet decision makers in terms of the U.S.S.R.'s security, ideological, cultural and economic goals in Southwest Asia; 2) the factors which act to constrain Soviet foreign policy in Iran and the Persian Gulf region and; 3) the strategic implications of Soviet policy in Iran for the United States Navy and U.S. national security. This analysis concludes that a superpower confrontation in Iran, although unlikely by design, is distinctly possible due to the volatile nature of Iran and the problems that beset the state of Southwest Asia.

Master of Arts in
National Security Affairs
June 1981

Advisor: J. Valenta
Department of
National Security Affairs

MALTA: A PARADIGM OF SMALL POWER
INTERNATIONAL NEGOTIATION STRATEGY

James Stewart Cooper
Lieutenant, United States Navy
B.A., University of Kansas, 1974

This thesis examines the recent foreign policy of Malta within the analytical framework of international negotiation theory. The island may be seen as a paradigmatic test-case of small-power international negotiation strategy in that Prime Minister Mintoff seems so far to have been unable to repeat his 1971 success in negotiating. The Zartman Structural Paradox that prevailed in 1971 has yielded to a more typical small-power situation as circumstances have changed. Malta's current status of unarmed neutrality is unlikely to persist.

Maltese decision-making and negotiations are examined as resulting from several determinants, including: (1) Malta's historical pattern of international relations; (2) the island's economic history and prospects; (3) nationalism; (4) the personal characteristics of the Prime Minister; and (5) the external influences exerted by other states involved in Mediterranean affairs.

Mintoff's Malta will probably pursue a foreign policy of nonalignment with economic and military guarantees provided by Italy, and perhaps other West European states.

Master of Arts in
National Security Affairs
December 1980

Advisor: D. S. Yost
Department of
National Security Affairs

THE KURDISH NATIONALIST MOVEMENT AND EXTERNAL INFLUENCES

Donald Bruce Disney, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

The Kurdish National Movement and External Influences is a historic examination of the Kurds, the Kurdish national movement, and the effects of external actors on the movement. It discusses who the Kurds are, where they are located and how many of them there are. The primary topics covered are Kurdish revolts, leaders, Kurdish political evolution, and the roles which local and non-Middle-Eastern countries have played in Kurdish national development. The primary countries discussed, as actors, are: Turkey, Iran, Iraq, Israel, the United States, and the Soviet Union. Kurdish links to other groups, such as the Armenians, and the Palestine Liberation Organization are also described. Finally an assessment as to the effects of external actors on Kurdish Nationalism is made and a prognosis for further Kurdish prospects is included.

Master of Arts in
National Security Affairs
December 1980

Advisor: J. W. Amos, II
Department of
National Security Affairs

CHINA'S XINJIANG UYGUR AUTONOMOUS REGION:
CORNUCOPIA OR ACHILLES HEEL?

Garron Lee Elders
Lieutenanat, United States Navy
B.A., San Jose State University, 1975

Although China's Xinjiang Uygur Autonomous Region (XUAR) is often overlooked or neglected, it is of significant importance in that the region could prove to be a major factor in the success or failure of China's current modernization effort. Containing one-sixth of China's landmass, Xinjiang is a cornucopia of vital resources such as petroleum, uranium and tungsten.

On the other hand, there are elements present which invite both domestic unrest and foreign intervention thus making Xinjiang an achilles heel. Foremost, are the fourteen different nationalities which account for more than half of the region's population. Another troublesome element is the XUAR's geographic location which is coterminous with the Soviet Union as well as remote from Beijing.

This thesis will examine the extent of Xinjiang's assets in natural resources and, contrarily, its vulnerabilities in both geography and strategic location. The major hypothesis involved is that if the XUAR's assets can be maximized and its vulnerabilities minimized then the region will contribute greatly to China's modernization effort.

Master of Arts in
National Security Affairs
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Advisor: C. A. Buss
Department of
National Security Affairs

THE YUGOSLAV ALL-PEOPLE'S DEFENSE SYSTEM: A PESSIMISTIC APPRAISAL

Douglas A. Frazee
Captain, United States Army
B.G.S., University of Nebraska at Omaha, 1977

The Yugoslav All-People's Defense System is designed to project cooperation and unity, to prepare the society for long-lasting resistance, and to equip and to train the entire nation for defense, while deterring all possible invaders.

The two most important factors in the All-People's Defense system are will power and fire power: the intangible and the tangible. This study examines these factors and evaluates their impact on the All-People's Defense system. The willingness to fight for Yugoslavia rather than the constituent republics and regions--is always in doubt. Fire power--the ability of the Yugoslav economic system to project material strength through agriculture, communications, industry, and transport--is questionable.

The All-People's Defense system suffers from various deficiencies as do other defense strategies. It is, however, the strategy that best fulfills the economic, political, and military demands for the Socialist Federal Republic of Yugoslavia.

Master of Arts in
National Security Affairs
June 1981

Advisor: J. Valenta
Department of
National Security Affairs

THEATER NUCLEAR FORCE MODERNIZATION AS AN
ISSUE IN WEST GERMAN POLITICS, 1977-1980

Thomas Carl Glad
Captain, United States Army
B.A., University of Wisconsin, 1971

This thesis reviews the dominant opinions within the main political groupings of West Germany regarding the two major theater nuclear modernization issues of the recent past--enhanced radiation weapons (ERW) and long range theater nuclear forces (LRTNF). The broad strategic context of both the ERW and LRTNF questions sets the scene for exploration of the major hypothesis: whether differences in the capabilities of proposed new theater nuclear systems are a principal variable in explaining the positions adopted by each of the three major political party groupings in West Germany--the CDU/CSU, the SPD-FDP government, and the left wing of the SPD. The thesis concludes that weapons characteristics did influence the government. Characteristics of the political balance in the West German political system, however, as well as perceptions of Soviet threat and reliability of American guarantees to Europe, were also significant.

Master of Arts in
National Security Affairs
December 1980

Advisor: D. S. Yost
Department of
National Security Affairs

THE BEAR AND THE FOXES: UNDERSTANDING SOVIET POLICY IN THE WARSAW PACT

David L. Greene
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

Eastern Europe has been the infant terrible of international politics in the modern era. Conflict within and about this region has precipitated two devastating world wars and continues to threaten the stability of the international system. In the postwar era, the Soviet Union has exerted its dominance in Eastern Europe in a manner which the Tsars would have surely envied. It is this dominance and the instruments through which it is achieved, that this paper is concerned.

Born of the East-West Cold War struggle, the Warsaw Pact has evolved to symbolize the calculated Soviet subjugation of Eastern Europe in the political and military spheres. This unwanted partnership, imposed by the Soviets on their reluctant allies, is far from the alliance Soviet spokesmen would claim. It is rather an instrument of a much broader integrationist program design to entrap and keep Eastern Europe in the socialist web.

Master of Arts in
National Security Affairs
June 1981

Advisor: S. A. Garrett
Department of
National Security Affairs

DOMESTIC DETERMINANTS OF AMERICAN STRATEGIC
NUCLEAR DOCTRINE: 1965-1980

Marc Arnold Helgeson
Lieutenant Commander, United States Navy
A.B., University of California, Los Angeles, 1971

This thesis examines the hypothesis that American strategic nuclear doctrine since 1965 has been significantly influenced by multiple domestic variables. This analysis begins with an examination of the changes in American strategic doctrine, as expressed in the Secretary of Defense's annual statement, between 1965-1980. The relationships which precipitated these changes are explored in terms of the following domestic variables:

- (1) American perceptions of the Soviet threat
- (2) Strategic weapons system development
- (3) American public opinion
- (4) The personalities of key American policy-makers
- (5) The Vietnam War

Because of the complex interrelationship between these variables, the modification of strategic doctrine can be accomplished only incrementally and thus rapid doctrinal change is virtually beyond the control of "grand strategists."

Master of Arts in
National Security Affairs
December 1980

Advisor: D. S. Yost
Department of
National Security Affairs

THE UNITED STATES AND SAUDI ARABIA: A SPECIAL RELATIONSHIP;
ITS BIRTH, EVOLUTION AND REAPPORTIONMENT

Jimmy H. Howard
Major, United States Air Force
B.S., University of Alabama, 1966

The primary purpose of this work is to define what has so commonly been referred to as a "special relationship" between the United States and Saudi Arabia. In accomplishing that task there evolved therefrom two paramount theses.

The first is that there is, indeed, a special relationship between the United States and Saudi Arabia and the second is that the relationship underwent a significant change in 1973. Founded shortly after the birth of the nation-state kingdom within a context of private economic venture, it was a decade later before the relationship was expanded to include bilateral government relations. The year 1973 marked a watershed in the relationship for it was events of that year which prompted a redistribution of share-interests and a metamorphosis of the relationship into something of greater complexity and intertwining of interests.

The method of approach is via chronological history. The first half of this work traces the birth and evolution of the relationship while the latter half focuses upon current vested national interests and possibilities of the future.

Master of Arts in
National Security Affairs
June 1981

Advisor: J. W. Amos, II
Department of
National Security Affairs

THE UNITED STATES, VIETNAM, AND THE NATIONAL INTEREST

John G. Karas
Lieutenant, United States Navy
B.A., Arizona State University, 1972

The purpose of this thesis is to assess the interests of the United States towards Vietnam from FDR to Carter; to trace the development of U.S. policies towards Vietnam under these presidencies; to define the issues in the current relationship between the two nations; and to set forth a strategy based on the political, economic and military needs of all the regional actors: the United States, Vietnam, China, ASEAN (Thailand, Malaysia, Singapore, Indonesia, and the Republic of the Philippines), Japan and the Soviet Union.

Master of Arts in
National Security Affairs
March 1981

Advisor: C. A. Buss
Department of
National Security Affairs

THE U.S. SECURITY INTEREST IN CHINA

Peter Francis Larson
Captain, United States Army
B.S., United States Military Academy, 1975

Since 1969, relations between the People's Republic of China and the United States have improved dramatically. This phenomenon occurred primarily as a result of a reappraisal of national interests by both nations' policy makers. In terms of security, the United States and China now pursue parallel security interests. In doing so, the U.S. must enact rational policies to protect this interest, while recognizing those of China and others.

Master of Arts in
National Security Affairs
September 1981

Advisor: C. A. Buss
Department of
National Security Affairs

SOVIET SUCCESSION 198? ; CONTINUITY OR CHANGE

Theodore R. Milton, Jr.
Captain, United States Army
B.A., Lafayette College, 1971

Since 1917 the Soviet Union has had only four top leaders--Lenin, Stalin, Khrushchev, and Brezhnev--for an appreciable length of time. While each period of succession had unique features, many consistencies can be identified which point toward the existence of enduring power variables within the system. The communist party, the military, and the heavy industrial interests have evolved as the key means through which leaders and potential leaders gain their strength. No one can successfully rule the Soviet Union without the support of these interest groups. This thesis discusses the functioning of these interests during periods of transition in order to support projections about the future. Conclusions are then offered regarding implications for U.S. strategy, given the probability of generational change in the Soviet leadership in the near future.

Master of Arts in
National Security Affairs
June 1981

Advisor: J. Valenta
Department of
National Security Affairs

MILITARY DICTATORSHIP IN GREECE (1967-1974)
THE GENESIS OF GREEK ANTI-AMERICANISM

Donald C. Munn
Captain, United States Army
B.S., Wheaton College, 1973

The years following the April 21, 1967 Greek coup d'etat have been marked by a considerable degree of anti-American sentiment felt and expressed by people in Greece who have been staunch allies of the United States since the end of the Second World War. A major consequence of this anti-American sentiment has been a serious degradation in relations between the United States and Greece. This thesis examines the American relationship with the military rulers of Greece between 1967 and 1974 in order to better understand the origins of Greek grievances with the U.S., the cause of the present estranged relations, and the implications Greek anti-American sentiment may have on future Greek-American relations.

Master of Arts in
National Security Affairs
June 1980

Advisor: D. P. Burke
Department of
National Security Affairs

A NEW ARAB ALLIANCE SYSTEM: CAUSES OF THE IRAQ-IRAN
WAR AND THE REACTION OF VARIOUS ARAB STATES

Robert Bernard O'Donnell
Lieutenant Commander, United States Navy
B.A., Villanova University, 1969

This thesis examines the current conflict between Iraq and Iran and looks at the causes, both stated and unstated offering an opinion as to the real causes of the war.

Secondly the thesis examines the Arab Nation and the reaction of several of the states of that nation to the war in an attempt to lay out why certain states support Arab Iraq or Persian Iran. Also included is a look at the impact of the war on the options available to the U.S. and U.S.S.R.

The thesis concludes with a look at the interworking of the various factors and stimuli to determine if a new Arab alliance will result from the war, and to state who will be the real winner of the war.

Master of Arts in
National Security Affairs
June 1981

Advisor: R. H. Magnus
Department of
National Security Affairs

JAPANESE AGGRESSION IN ASIA (1895-1930) JAPAN'S DREAM OF "HAKKO ICHUO"
(EIGHT CORNERS OF THE WORLD UNDER JAPANESE RULE)

John Yung Rhee
Defense Language Institute
B.S., Korea University
M.A., Monterey Institute for International Studies, 1968

This thesis analyzes Japanese aggression in Asia, 1895-1930 titled "Hakko Ichuo". This aggression began in 1895 when the Sino-Japanese War started after Japan attempted to extend its hegemony over the Korean Peninsula.

Chapters II and III examine the emergence of the military nation-state in Japan. Chapter IV and V discuss the Russo-Japanese War, Japan's industrial policy, and Japan in Manchuria. Chapters VI and VII examine the Japanese policy of aggression based on biased perceptions of its strategic interests.

Master of Arts in
National Security Affairs
December 1980

Advisor: S. Jurika
Department of
National Security Affairs

THE INFLUENCE OF ISLAM IN TURKEY

Terry Edwin Rutledge
Major, United States Army
B.A., Arkansas Polytechnic College, 1969

This thesis explores the influence of Islam in Turkey today. Dealing primarily with Republican Turkey, the influence of Islam is traced through the development of the various Turkish constitutions, through a brief study of the political elite structure, and finally by looking at the individual Turk.

Although Islam is being seen as slowly being eroded by 'secularization-by-modernization,' it is still seen as a very strong, if subtle, force in the Turkish social fabric.

Master of Arts in
National Security Affairs
March 1981

Advisor: R. H. Magnus
Department of
National Security Affairs

JAPAN AT THE CROSSROADS ARMAMENTS AND INDEPENDENCE

Peter Raymond Smith
Lieutenant Commander, United States Navy
A.B., Providence College, 1968

As a result of the concurrence of changes in the strategic environment in Northeast Asia and the severe economic recession in the defense industries, the Japanese are at a crossroads in the formation of their future defense and foreign policies.

From 1967 to the present time Japan has pursued a low key foreign policy which prohibits the exportation of weaponry. This policy was possible only because of the Japanese reliance on the defense umbrella of the United States and the continuing prosperity of the Japanese economy.

It is the hypothesis of this thesis that the original force of the ban on arms export is beginning to erode as the twin premises on which the policy was based are in the process of change. Evidences of this erosion are examined with a view to determining whether the variations are temporary and isolated or whether they are manifestations of a growing consensus advocating new directions as a basis for permanent policy.

Master of Arts in
National Security Affairs
December 1980

Advisor: C. A. Buss
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National Security Affairs

MAXIMIZING NEGOTIATIONS OVER UNITED STATES' NATIONAL INTERESTS
WITH THE ASSOCIATION OF SOUTHEAST ASIAN NATIONS

Gary L. Stubblefield
Lieutenant Commander, United States Navy
B.S., University of Idaho, 1969

The Association of Southeast Asian Nations (ASEAN) is comprised of Thailand, Malaysia, Singapore, Indonesia, and the Philippine Islands. This region strategically encompasses the primary route between the Indian and Pacific Oceans. Furthermore, it is rich in natural resources. Consequently the U. S. has many national interests in the ASEAN region. This paper describes those interests in four categories: (1) Security, (2) Economic, (3) Political, and (4) Social/Cultural. Some Washington policy-makers negotiate U.S. interests bi-laterally with each individual nation without regard for their grouping. Others deal regionally through ASEAN. It is the intent of this thesis to analyze the optimum route our planners should follow when negotiating our policies and goals concerning this region.

Master of Arts in
National Security Affairs
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Advisor: F. M. Teti
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National Security Affairs

THE U.S.-ROK SECURITY RELATIONS: THEIR
IMPLICATIONS FOR THE FUTURE OF KOREA

Philip Pyong Sunoo
Defense Language Institute
B.A., National Taiwan University, 1961

This thesis, entitled: "The U.S.-ROK Security Relations: Their Implications for the Future of Korea," reviews the development of the U.S.-ROK relationship through three distinct periods; until the end of the Korean War; from the Korean War to President Carter's assumption of office; and during the Carter Administration. In the light of the explosive strategic environment in Northeast Asia, the hypothesis is examined that the mutual interests of South Korea and the United States demand that the stability of South Korea and the continuous undiminished U.S. commitment to South Korea's security are essential for the protection and progress of their mutual interests. An in-depth analysis of both political and strategic implications involving such issues as a phased U.S. troop withdrawal from Korea, a North-South non-aggression pact, a multilateral guarantee of Korea's neutrality, and a cross-recognition of North and South Korea and a possible 4-power or 6-power conference has been made.

Master of Arts in
National Security Affairs
March 1981

Advisor: C. A. Buss
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National Security Affairs

THE ECONOMIC CONSEQUENCES OF AN INVASION
OF POLAND BY THE SOVIET UNION

William Allen Weronko
Lieutenant, United States Navy
B.A., University of LaVerne, 1974

This thesis examines the economic situation and implications of a Soviet invasion of Poland. The analysis concerns the state of the Polish and Soviet economies and the possible economic effects of an invasion by the Soviet Union of Poland. The hypothesis offered is that the weaknesses of the economic system of the U.S.S.R. are of a magnitude that an invasion of Poland would have such devastating economic consequences that it is the major inhibiting factor to any like action. Although a Soviet armed invasion is not completely ruled out, the economic realities of both Poland and the Soviet Union impose formidable constraints on any attempts to crush the Polish reform movement in a way that would result in Western economic retaliation.

Master of Arts in
National Security Affairs
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SEA-LANE DEFENSE: AN EMERGING ROLE FOR THE JMSDF?

Ted Shannon Wile
Lieutenant Commander, United States Navy
B.A., Pennsylvania State University, 1971

Japan's economy, the third largest in the world, is totally dependent on the sea lines of communication for the importation of 90 percent of its energy requirements and strategic metals and for over 70 percent of its food. Despite the importance of the sea-lanes to Japanese security, the Japanese Maritime Self-Defense Force (JMSDF) remains incapable of protecting those sea-lanes against interdiction. Although the JMSDF is currently the seventh largest navy in the free world, future expansion has been stymied by Japan's steadfast refusal to increase defense spending above one percent of the GNP. Long-range procurement plans focus on qualitative improvements with a primary emphasis on anti-submarine warfare, a strategy which could foreshadow a building program to enable the JMSDF to control the vital sea-lanes. On the other hand, political and domestic constraints on a strong military indicate a continuing reliance on the United States for Japan's security. This study examines the factors affecting military decision-making in Japan, looks into the problems and realities of sea-lane defense and analyzes the future prospects for JMSDF.

Master of Arts in
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Advisor: E. A. Olsen
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